JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

JULY, 1834.

Remarks on the method of laying the iron plates on Wooden Rail-roads.

By Alfred C. Jones.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—Having read in the September number of this Journal, the valuable remarks of the Editor on rail-roads, and thinking that any hints which may tend to render them safer for travelling on will be acceptable, I proceed to give some observations in addition to those which have been the subject of the Editor's notice.

The plates, or bars, on the Little Schuylkill Rail-road are of two kinds, about four-fifths of the number are two inches wide, and scant half an inch thick; the remainder are two inches in width by scant five-eighths in thickness in the middle, the top side being slightly rounding. The angles of the ends of those first mentioned are about forty-five degrees, and the angle of the others twenty degrees.

There are two locomotive engines plying on the road, and in the course of last season, they ran off the track fourteen times; the cause of running off was each time traced to the acute angles of the ends of the first described bars, which projected out enough to strike the flanch and cause the wheel to rise above the rail, and, of course, the engine to leave the track. I do not recollect a single instance in which the engine or cars have run off where the angles of the ends of the bars are twenty degrees.

It is urged in favour of using the angle of forty-five degrees that

the bearing will be more perfect at the joints, and that the ends of the bars will not sink so much into the wood.* By a personal examination of several miles of the road, I found that there was little difference in the depression of the ends of the bars in the wood, where the different angles before described were used; in those of forty-five degrees the inner point was sunk more than the middle of the end of the bar; some which I measured were as much as a quarter of an inch lower.

It is well known that the bars become loose from vibration, and other causes, and in running round a curve in the direction of the arrow in the figure; the centrifugal force acting against the bar A, forces it from its place, which leaves the point of the bar B projecting; this defect is often increased by the bars being previously out of line.

There is a great error in laying the bars with the ends butting, close together, nothing being allowed for the expansion of the metal; there are a number thus laid on the Little Schuylkill and Columbia Rail-roads, and at the present time the point of a penknife cannot be inserted at their joints.

As the stiff castings for turn-outs are going out of use, I will say but little about them, it being admitted by all who have had any experience on rail-roads, that they are the most unsafe thing in connection with the road. The best kind of turn-outs now in operation are those in which the switches, or rails are movable, they being connected together with one or more rods, so that they will open or shut together; the length of the switches on roads where steam is the motive power, should in no case be less than six feet, and the turn-outs in proportion.

It appears to me to be an improper method of laying the bars so that the cross section shall be horizontal, where engines and cars with conical wheels are used, the bearing being on the inner edge until the bar settles in the rail. By the examination of a cross section of several old rails, they having been cut where the bearing was on the sleeper, I found that the cohesion of the wood was destroyed on an average five-sixteenths of an inch from the inner side. I would suggest that the bars should be laid at a greater bevel than the cone of the wheel calls for; the inner side of the rail in this method would not be acted on until the bar had a perfect bearing.

I have confined my remarks principally to wooden roads, as I consider that they are the only kind proper for locomotive engines, the wear and tear of the machinery being less on them.

Respectfully yours,
A. C. Jones.

P. S. There was a slight mistake in the latter part of my commu-

* On the Columbia, and Philadelphia, and Trenton rail-roads, there are plates of iron secured flush with the top of the rail to prevent the ends of the bars from sinking in the wood. Some engineers have used plates of zinc for the same purpose, which are as suitable as brown paper.

nication on using anthracite coal in smiths' work;* it should read thus: The tuyere iron may be protected from the intense heat of the fire, by occasionally throwing a little of the refuse coal against the fire back, which coal melts down and coats the iron.

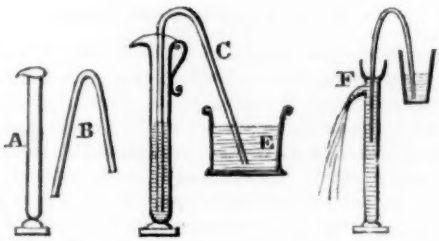
Philadelphia, April 15, 1834. A. C. J.

Description of a new mode of using the Syphon. *By* THOMAS EWBANK, *of New York city.*

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—Having lately had occasion to use a syphon, I tried one in the form represented page 336, vol. ix. Journal of the Franklin Institute—but it is only applicable in those cases where the short leg can be plunged into the liquid up to the bend. If, at *any time*, the liquid to be withdrawn is not equal in depth to the length of this leg, this syphon will not act: hence its application is very limited. The second one, described in the next page (337) is not subject to this objection, but when used for different acids, &c. the contents of the pipes *d* and *c* would require to be discharged. (Ought not the short leg in the cut to have been represented as the longest?†)

The following plan suggested itself, which I find to answer very well.



A, is a tube closed at its lower end, and equal in length to the longest leg of the syphon B, which is placed in it, as at C; and it is then to be filled with water or other fluid, and the other leg of the syphon placed in the liquid to be withdrawn. A, is then moved down, which causes the liquid to rise into the short leg and fill the syphon. Its descent should rather exceed the distance between the surface of the liquid to be transferred and the bend of the syphon. A, may then be either wholly removed or not, for when the syphon is filled, the discharge of the liquid may be made by a spout or tube attached to A,

* See this Journal, vol. xiii. p. 73.

† Our correspondent is correct in this remark on the cut referred to.

COM. PUB.

as at F; and to stop it nothing more is required than to slide the tube up till the spout is above the surface of the liquid in E.

Might not this plan be advantageously adopted in withdrawing poisons from the stomach in cases where a pump or other means are not at hand? I ought to have mentioned, that the capacity of that part of the leg inserted into A, should exceed that of the remaining part of the syphon; on this account it should be rather larger in diameter.

Liquids may be raised to a higher level by this method. At page 226, vol. xii. of this journal, is described an ingenious apparatus by Prof. Hare, for transferring acids, &c. which will serve for illustrating this remark.

Supposing the capacity of the tube which connects the syringe to the bottle, was equal to that of the latter, and it were inclosed in another similar to A in the above figure. By filling it with the liquid, and then allowing it to descend (as low as the acid has to rise) the bottle would be filled. This apparatus would in such cases act as a substitute for a pump, and be free from friction. In those cases where a small quantity of liquid is required at a time, and it is inconvenient to allow a descent equal to the rise of the fluid, a vessel of mercury or other heavy fluid might be advantageously substituted.

Very respectfully,

THOMAS EWBANK.

Description of an instrument to be used with the Stomach Pump.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—The description of Dr. Goddard's stomach pump, contained in the number of your Journal for April last, brought to my recollection an instrument invented by me several years since; which I believe to be a necessary appendix to the stomach pump. It may be called a gag; the form of which is explained by the accompanying figure; it should be made of steel, say three-fourths of an inch wide,

the circular end having a spring temper; the arc is serrated on the inner edge, and works through a slot in the lower leg. When to be used, place the finger on the lever of the click, press the two legs together, and insert the end in the mouth of the person to be operated on, so that the hooked ends may set on the front teeth. If the person then open his mouth, the spring will keep the ends of the gag in contact with the teeth, the click preventing him from shutting it again until the gag is removed. I have several times witnessed the operation of extracting poison from the stomach; the instrument employed for keeping the mouth open, was the handle of an iron spoon or a door key, which did considerable damage to the teeth, and in one case the flexible pipe connected with the pump, was nearly bitten in twain, the spoon having slipped from between the teeth.

Respectfully, yours,

Philadelphia, May 14, 1834. A. C. JONES.

FRANKLIN INSTITUTE.

Monthly Conversation Meetings.

The monthly meeting of the Institute for conversation, was held at the Hall of the Institute April 24, 1834.

Mr. John C. Warren of the city of New York, exhibited a machine for hoisting heavy bodies, invented and patented by Mr. John Drummond. This machine was much admired for its compactness and efficiency and for the ease with which the intensity of the applied power could be varied.

Mr. Tyler, of the firm of Tyler, Fletcher, & Co., of this city, exhibited and explained the use and operation of a vibrating roller press, made by the above mentioned firm, for transferring engravings from original plates, or dies, to those intended to be used for printing, as in bank note plates, &c. A description of this machine is expected to appear in a future number of the journal.

Mr. Isaiah Jennings, of New York, exhibited several of his lamps for burning spirit gas.

A new door plate by Mr. Paul Moody was examined, and its merits discussed; this door plate has the name inserted beneath a plate of glass, which is set in a brass frame, resembling, in form, the ordinary door plate.

And at the monthly conversation meeting held May 22, 1834—

Professor Johnson made experiments on the centrifugal force of liquids, in refutation of certain statements made by M. Thayer, in a paper read to the French Institute, an outline of which has been given in the Revue Encyclopedie for September, 1833. The liquids used were oil, water, alcohol, and mercury, and the experiments embraced the cases of rotation about the axis of a vessel in which the oil and water were placed, as well as the vibrations of the vessel containing alcohol, water, and mercury. A detailed account of the experiments may be expected in the next number of the Journal.

Jacob Green, M. D. exhibited an electro-magnetic apparatus by Prof. Henry, for the production of a reciprocating motion, by the combined action of electro-magnetic currents and of permanent magnets. He also referred to a modification of the same, in which electro magnets being substituted for the permanent magnets used in this apparatus, the whole effect would result from the magnetism developed by galvanic action.

Mr. Samuel B. Sexton, of Philadelphia, exhibited a model of an apparatus invented by him, for warming houses by heated air, and so constructed that at the same time the various modes of cooking can be performed by it, without interfering with its other purposes; it can be applied to either, or both purposes, at the option of the proprietor.

Prof. A. D. Bache brought forward articles of apparatus for the polarization of light, recently imported for the Friends' College at Haverford The polarizing effect of the tourmaline was seen by a simple

arrangement of two plates of that mineral, cut parallel to the axis, and fitted into wire rings so as to admit of rotation while the plains remain parallel to each other. A complete instrument for the polarization of light by reflexion formed the second article.

Specimens of tinned lead pipe, from Mr. Ewbank, of New York, were placed upon the table; but the lateness of the hour at which the other subjects were concluded, prevented an examination of them.

Report of the Managers of the Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts, in relation to Weights and Measures. Presented in compliance with a Resolution of the House of Representatives.

TO THE HON. JAMES FINDLAY,

Secretary of the Commonwealth of Pennsylvania.

The Managers of the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic arts, respectfully present to the Secretary of the Commonwealth their report in relation to the subject referred to them by the direction of the House of Representatives. At the stated meeting of the Managers, next subsequent to the receipt of the communication of the Secretary of the Commonwealth,* dated May 29th, 1833, a committee† was appointed to consider the subject, and to report to the Managers of the Institute. Their report, which has been unanimously adopted, is now respectfully submitted. It is believed that no more time has been consumed by the committee than was required by a careful investigation of the subject intrusted to them, and the Managers hope that the delay of this report beyond the time of meeting of the Legislature, will be attributed to the necessity of the case.

ALEX. FERGUSON, Chr'm.

Wm. Hamilton, Actuary.

REPORT IN RELATION TO WEIGHTS AND MEASURES IN THE COMMONWEALTH OF PENNSYLVANIA.

Adopted by the Managers of the Franklin Institute, January 25, 1834.

The Committee of the Franklin Institute, appointed by the Board of Managers to consider the subject of Weights and Mea-

* See Appendix No. I. vol. xii. p. 304.
†See Appendix No. III. vol. xii. p. 309.

sures, referred to them by direction of the House of Representatives of the Commonwealth, respectfully report:

That since the date of their appointment, in June last, they have given to the subject the attention which its importance so well deserved. In order to have before them, in a condensed form, the facts relating to the practical bearing as well as to the theory of the matters of inquiry, the Committee requested from three of its members* reports upon the systems of weights and measures, of England, and of France, and upon the state of the question in our own country. The reports† contained in the Appendix, herewith presented, resulted from this request. In the first of these is given a description of the French metrical system, and of the scientific operations required in its establishment; in the second, a brief history of the weights and measures of England, with the method of connecting the recent and reformed system with a scientific basis; and in the third, an abstract of the reports upon weights and measures made to the Congress of the United States, and to the state Legislatures of Pennsylvania and New York. An examination of these reports will show from how many points our subject has been viewed, and in what varied lights, and how little novelty can be expected in any view which at this time may be submitted. This circumstance will perhaps be found of important practical benefit, for a desire to present what is novel, may have led to much of the inapplicable speculative inquiry with which the subject is encumbered.

The Committee think that they may assume that the House of Representatives, of the Commonwealth, in referring, the bill relating "to weights and measures and to admeasurement" to the Managers of the Franklin Institute, did not intend to confine their report exclusively to the consideration of that bill, but rather that it should form the basis of their investigations.

With this view of their duties, the Committee would propose to consider the subject under two suppositions; the first, that the Legislature of Pennsylvania shall determine, or have determined, to legislate in relation to a system of weights and measures for this commonwealth, independently of other states; secondly, that a combined action by the several states, or by the Congress of the United States, may be admissible.

In legislating upon any matter which in its varied ramifications affects almost every business in which men engage, there cannot be too much caution. Usages have grown up in all trades which have become a part of those trades, which require a portion of an apprenticeship to learn, in contravening or changing which by law, the interests of the citizen, if not his rights, are

* See Appendix No. III. vol. xiii. p. 94.
† See Appendix Nos. IV, V, & VI. vol. xiii. p. 94, 160, 232.

infringed. Hence the necessity of entering thoroughly into details which can only be supplied by the members of each art, or trade, from their own knowledge of their own wants, and which should properly vary with the progress of that art; or of leaving such details to adjust themselves, upon the basis of careful legislation upon general principles.

A system of weights and measures which aims at furnishing such general principles, should establish the standard of linear measure, and fix the relation of the standard of capacity measures to that of the linear measure; should provide for procuring, preserving, and distributing positive standards of measure and of weights, and should refer the entire system to natural invariable standards, by which its permanence might be secured. It should be accompanied by a supplementary law less fixed in its character, which should state the principal denominations of the several measures and of the weights, and their relation to each other and to the standards.

The system may contemplate an entire change in the standards and in the denominations; or it may aim at providing standards in conformity with those in most common use, and by which the accuracy of existing standards may be at all times tested, and at improving existing denominations.

The case of an entire change is presented by the French metrical system, where throwing aside, in their measures the denominations of foot and toise, they adopted a new denomination, the metre, corresponding to a new length, the ten millionth part of a quadrant of a terrestrial meridian. The present English system is in part of the second kind; leaving to usage to establish the denominations, it aims at providing positive standards of authority, and of perpetuating them by their comparison with invariable standards furnished by nature. The inability of the first system, to contend against usage, is to be found in the establishment by law in France of a metrical foot, one-third of a metre in length, of a metrical pound half the kilogramme of the new system in weight. Had one currency been in use throughout our infant country, when the present currency was established, it is not impossible that its beautiful simplicity might, even at this day, have existed only in theory.

Sound policy, nevertheless, requires that, from time to time, such changes should be introduced in existing denominations as will tend to simplify the system, and to bring it gradually nearer to perfection, but even in these, perhaps, the law should follow indications of change dictated by convenience, rather than undertake to lead them.

A system of weights and measures and of denominations based upon that in common use in our country, would include the fol-

lowing particulars: first; a reference to some existing measure, as the standard of length; as, for example, to a certain yard measure in the possession of the state, which should be declared at a certain temperature to be the linear unit. The multiple and submultiple denominations of this standard, should be declared as lines or nails, inches, feet, perches, &c. Second; a unit measure of capacity, as for instance the bushel, should be defined in reference to the linear standard. This unit might be taken for both dry and liquid measures, or it might be deemed adviseable to conform to usage by providing different units for liquid and for dry measure. In regard to the denominations an obvious improvement might be made by avoiding the use of the same name for things essentially different, as a gallon for different capacities according to its use in dry or in liquid measure, a change which would not fail to be sanctioned by general adoption. Third; a reference to a positive standard for weight, as a certain pound in the possession of the State. The multiple and submultiple denominations to be regulated. And here a question presents itself, whether it may be possible to have but one unit of weight denominated the pound, rejecting the troy or avoirdupois pound, as may be thought adviseable. In choosing between them the difficulty presents itself that the former pound has been legalized by Congress in our coinage, by referring to the standard troy pound in possession of the mint, while the latter is the pound generally used in commerce. It is probable that this innovation could not be made with advantage at present. In regard to the denominations a similar difficulty is presented in the ton, which is either 2,240 or 2,000 lbs. according to locality, or to usage, or to agreement. To the adoption of the ton of 2,000 lbs. technically called the short ton, there does not seem to be any insuperable objections. It is so convenient in practice that it has been legalized by several of the states, and is used in many cases, in our own commonwealth.

In providing for the distribution of positive standards throughout the state, the nature of the material of which they shall be made, will be an important item. For the material of their positive standards of length, the French adopted iron, the English brass; for those of weight, the former employed platinum for the original standard, and brass for the copies, the latter brass for both. In case of the adoption of either metal, it would be important to inquire by experiment more carefully than has been hitherto done, into their relative expansions under different circumstances of manufacture. This would not bear merely upon the theoretical perfection of the standards, but upon that in practice, for two standards which were alike when made in winter, might if compared in summer differ so much, that one would be

thought to require the expense of alteration. If the yard stick of the merchant will not be changed by this difference, it will become sensible in the chain of the surveyor, and the land holder will find his limits affected by it.

Next, the positive standards thus provided, should be referred to some natural, invariable standard. The necessity for this reference is so frequently denied that the object would seem not always to be perceived. Positive standards are liable to change by accident and by use. Let us suppose a case in which a standard of measure belonging to the Commonwealth and carefully deposited in one of its offices, receives injury in taking it down for examination or in the course of a comparison of another measure with it. The county standards are resorted to, for the purpose of recovering the original length of the standard, but if not well preserved, or if frequently used, they disagree. It is in such a case, and the probabilities are strong of the occurrence at some time of similar cases, that the natural, invariable standard becomes the means of deciding between the varying measures. The length of a pendulum vibrating seconds, or the arc of a meridian is measured by using either of the measures; the length thus found is the same number of inches and parts of an inch with that of the pendulum, or of the arc, which was previously fixed, with reference to the original standard, or is so many parts of an inch too long, or too short, and the length of the original measure is known by reference to that which has been tested. But it is not necessary to resort to any supposition of accident which may occur to the positive standard; the experience of England has shown that under ordinary care, changes will be found from century to century, and that measures which are at one time easily known and recognized to be the standards, may at some other time be the subjects of antiquarian research. Part of the reproach under which the scientific operations here referred to, lie, namely, that they are liable to corrections as science progresses, is due to the fact that experimenters have not been satisfied with stating the results of experiment, but have endeavoured to deduce from theory the relation between those results and others in other circumstances, using for this purpose the data furnished by the science of the day. Thus they have not been satisfied with stating that the pendulum vibrating seconds, and in a circular arc, measured with a means described, at a given temperature and pressure, and at a particular spot, was a certain number of inches of the standard; but they have undertaken from their experiment to conclude what the length would be in a vacuum, in a small arc, at an assumed temperature and pressure, at the level of the sea, and in a particular latitude, and these before the weight of the air, the effect of its buoy-

ancy &c. were well known and established, even according to the knowledge of the day.

The Committee, in the discharge of the duty committed to them by the Managers, proceed to submit their examination of the bill referred by the House of Representatives; in this they will be as brief as is permitted by the fact that many of the provisions of it are at this time the law of the state. If the Committee are correct in the ideas which they have already expressed in relation to the requisite enactments for regulating weights and measures, the objection to the bill, on the score of its leaving general principles to enter partially into details, is a sound one; this remark has reference more particularly to that part of the bill which relates to admeasurement, in relation to which it will be necessary for the Committee to go into minutiæ, in order to be intelligible.

The twenty-seventh and twenty-eighth sections establish a certain ratio between the weight of different commodities, and the measured bushel, in regard to which, as far as the usage of this portion of our State can be ascertained, four of the commodities mentioned are not bought and sold by weight; and of the two which are, one is always purchased at a different weight per bushel from that assigned in the sections, the brewers of Philadelphia always buying their barley at the rate of forty-eight pounds to the bushel. Salt of all descriptions pays duty at the rate of fifty-six pounds to the bushel and is in all cases sold by measure. The usage will probably be found to be different in other parts of the state, for where materials are concerned which have weights in proportion to their bulk, varying with soils and seasons, or, as in the last case, with the moisture of the air, equitable dealing could not fail to produce such differences.

In regard to the sale of anthracite coal, provided for by section twenty-nine, no mention being made of the bituminous coal, usage has established its sale by weight, and no necessity exists for providing a ratio between measure and weight.

The measure of an acre of land, of a cord of wood, or bark, the contents of a hogshead of cider, each is made the special subject of a section, while other superficial measures, the measurement of lumber &c., the contents of casks of beer, ale, whiskey, &c. &c., are left, as indeed all should be left, to the regulation of inspection laws, or to usage.

Section tenth is liable to similar objections, as providing for a peculiar form to be given to the bushel for measuring lime, which is one only of the many commodities sold by the heaped bushel. A provision for a legal standard bushel would regulate all such cases. The law provides in section seventh for both a wine and a beer gallon, a provision which the committee consider particu-

larly objectionable, the inconvenience of two different measures having the same name, is obvious, and practice confirms the conclusion, the beer gallon being no longer, as far as the committee can ascertain, in use, at least in the city of Philadelphia.

The Committee would further remark, that they have not been able to find why the regulator of the weights and measures of the city of Philadelphia, should not be subjected to the same enactments with other regulators or inspectors: the want of inspection laws to regulate the duties and fees of the office, seems to be felt by the citizen who now fills, with industry and zeal, the office of regulator of this city.

Leaving these details, the Committee would urge a general objection to the portion of the bill referring to the positive standard for weights and measures. It is that after providing for procuring those standards and distributing them, by means which would require an expenditure not at all, however, beyond the necessity of the case, it renders nugatory the whole of the work done, by providing that whenever the United States standards shall be declared, those of the states shall conform thereto. The existence of a system which has cost the state much time and labour is thereby made contingent upon their obtaining standards which *may* be those adopted by Congress at some future day, or upon the want of action of the United States upon the matter. The difficulty of a change after a complete distribution of standards would necessarily be much greater than at a time when the want of some standard was generally admitted.

With great deference to the body who are to consider the subject, the Committee have prepared an altered draught of a bill in conformity with the views which they have submitted in the foregoing, and which they respectfully submit for examination, under the supposition that legislation is, at this time, deemed adviseable. The bill containing the general provisions for a system of weights and measures, is accompanied by a supplementary one establishing the legal denominations. In regard to the manner of this appointment of regulators or sealers of weights and measures, to the securities to be required for the faithful performance of their duties, to the penalties for negligence, and to the penalties for infringement of the provisions of the bill, the Committee do not consider it within their province to offer any remarks, further than that they are of opinion that they may conveniently form a separate subject of legislation, and should not be incorporated with the general enactments.

The Committee will next proceed to a more grateful portion of their duty, than that which required the criticism of the bill referred to them; namely, to consider the case in which action by the Congress of the United States, may be deemed by the Legisla-

ture to be adviseable. Next to the inconveniences which result from a varying standard of measure and weight in the same community or neighbourhood, may be ranked those produced by a want of uniformity in the standards of different contiguous States; for it must happen in a republic organized as is our own, that the different parts of the same state have less frequent communication requiring the use of such standards, than the adjacent parts of the different commonwealths. So impressed are the Committee with this view, that they would express it as their decided opinion that the most imperfect system of weights and measures which has ever been framed, would if applied in all the states of our union, be preferable to the most perfect system which should be adopted by any one commonwealth singly. The constitution having delegated to Congress the power "to fix the standard of weights and measures," there seems to be no doubt but that that body have authority to legislate upon such a system as has been offered for the consideration of the House of Representatives of this Commonwealth, in which the object is rather to fix standards so that they shall not be liable to change for the future, than to make any innovations in existing legal standards. Indeed in most of the laws of more recent origin adopted by the several states, there is a distinct provision that when Congress shall furnish a system of weights and measures for the United States, the temporary State standards shall be made to conform to the national standard. The exceeding importance of uniformity is thus distinctly set forth, from quarters of the highest authority in the different parts of our extended republic.

In the multitude of objects to which the national legislation must be directed, it is hardly to be wondered at, that no action should have taken place upon this one. If the wants of the States, or of any of them, should be expressed, Congress could hardly fail to take up a subject upon which so much unanimity of view might be expected. Frequent consideration has been given by that body, to providing a system of weights and measures even without the stimulus just referred to, as appears by a reference to the analysis of their proceedings accompanying this report.* So far as the collection of the revenue is concerned, the object of uniformity in the standards is near its accomplishment, under directions, issued from the Treasury Department of the United States, for the distribution of standards to the Custom Houses; and thus one motive which might have induced the action of Congress is removed, and the necessity for exertion on the part of the States to secure so desirable an object, is increased. That standards issued to the Custom Houses, can be substituted for na-

* Appendix No. VI. vol. xiii. p. 232.

tional standards; even though legalized in the collection of the revenue, by an act of Congress, is obviously impossible: unrecognized by the laws of the states which contain no provisions deferring to such standards; not placed at all in some of the states, and but sparingly distributed in any, they could not even by usage and in violation of the state laws, become standards. They would tend merely to increase the diversity of standards, and unless conforming to those of the state in which they were introduced, would cause duties to be paid on commodities by one measure or weight, which were sold by a different standard. The committee would therefore most respectfully request the Managers of the Franklin Institute, to urge upon the House of Representatives, of this Commonwealth, to call the attention of Congress, through our Senators and Representatives, to the necessity of fixing the standard of weights and measures, throughout the United States; and further to suggest that the co-operation of the legislatures of other states be obtained by executive communication.

Your Committee feel satisfied that the House of Representatives of this Commonwealth may lay the subject now under consideration before Congress in a form so conveniently adapted to their legislation upon it, that a speedy action will be ensured. But should this action be delayed for two or three years, the inconvenience of action under existing laws, for such a period, would hardly counterbalance the probability of benefit to be derived from legislation by Congress. If such just hopes should be disappointed, the people of this Commonwealth would then confidently look to the care of their legislature to furnish them with standards so essential to the dealings of all classes of the community.

COMMITTEE.

Alex. Dallas Bache,
S. V. Merrick,
William H. Keating,
Rufus Tyler,
M. W. Baldwin,
Benjamin Say,
Asa Spencer,
Abraham Miller,
R. M. Patterson, M. D.
Sears C. Walker,
Benjamin Stancliff,
Thomas McEuen, M. D.
Edmund Draper,
David H. Mason,
Benjamin Reeves,
Thomas P. Jones, M. D.
Frederick Fraley,
Samuel Moore, M. D.
Samuel Hains.

AN ACT TO FIX THE STANDARDS OF MEASURES AND WEIGHTS IN THE COMMONWEALTH OF PENNSYLVANIA.

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9.—Provides for the distribution of the county standards.
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11.—Positive standards to be referred to natural, invariable standards.

An Act to fix the Standards of Measures and Weights.

Section 1.—Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same: That the standard unit of all measures of length shall be the "yard" to conform to that in use in this Commonwealth at the date of the declaration of Independence, the positive standard to be obtained as hereinafter described; and that one-third of said yard shall be one foot, and one-twelfth of said foot shall be one inch.

Section 2.—And be it further enacted by the authority aforesaid, That the standard of liquid measure shall be the gallon, to contain two hundred and thirty-one cubic inches of the standard aforesaid, and no more. And that the standard of dry measure shall be the bushel, to contain two thousand one hundred and fifty cubic inches, and forty-two hundredths of a cubic inch of the standard aforesaid, and no more.

Section 3.—And be it further enacted by the authority aforesaid, That the standard of weight shall be a pound, to be computed upon the troy pound of the mint of the United States, referred to in the act of Congress, of 19th May, 1828, to wit: the troy pound of this Commonwealth shall be equal to the troy pound of the mint aforesaid; and the avoirdupois pound of this

Commonwealth shall be greater than the troy pound aforesaid, in the proportion of seven thousand to five thousand seven hundred and sixty.

Section 4.—And be it further enacted by the authority aforesaid, That it shall be the duty of the Governor of this Commonwealth to procure within — years, from the date of the passage of this act, a standard yard to constitute the positive standard of length in this Commonwealth; said standard to be equal in length, at the temperature of melting ice, to the distance between the eleventh and forty-seventh inches on a certain brass scale of eighty-two inches in length, procured for the survey of the coast of the United States, and now deposited in the War Department. The material of said standard to be brass, and the divisions upon it to be inches and parts of an inch of the brass scale aforesaid.

Section 5.—And be it further enacted by the authority aforesaid, That it shall be the duty of the Governor to procure, within — years after the passage of this act, for the use of this Commonwealth, a standard gallon and bushel, to conform to the provision of section second, of this act. The material of said standard to be cast brass.

Section 6.—And be it further enacted by the authority aforesaid, That it shall be the duty of the Governor of this Commonwealth, to procure within — years after the passage of this act, a duly authenticated copy of the troy pound of the mint of the United States, to constitute the positive standard of weight of this Commonwealth. The material of said standard to be brass.

Section 7.—And be it further enacted by the authority aforesaid, That it shall be the duty of the Governor of this Commonwealth to have the positive standards of measures of length and capacity, and of weight, provided by the foregoing sections, inclosed in suitable cases and deposited in the office of the Treasurer of this Commonwealth, to be by him, there carefully preserved.

Section 8.—And be it further enacted by the authority aforesaid, That it shall be lawful for the Governor of this Commonwealth, when he shall deem it expedient, to have tested the conformity of said positive standards of measure and weight to the foregoing provisions of this act, or to the natural, invariable standards hereinafter provided.

Section 9.—And be it further enacted by the authority aforesaid, That it shall be the duty of the Governor to provide within—years after the passage of this act, for each of the counties of this Commonwealth, at the charge of the counties respectively, duly authenticated copies of the positive standards of measures of length, of capacity, and of weight, referred to in the

foregoing sections, of the material therein referred to, and of approved construction. And having caused the same to be duly stamped, to have them delivered to the Commissioners of the counties respectively, to be used as standards for the adjusting of weights and measures, and for no other purpose.

Section 10.—And be it further enacted by the authority aforesaid, That it shall be the duty of the Commissioners of the respective counties, at least once in every ten years, and oftener if they have reason to believe it necessary, to cause the standards of the respective county to be examined and tried, and, if necessary, to be corrected or renewed according to the standards of the Commonwealth heretofore referred to.

Section 11.—And be it further enacted by the authority aforesaid, That it shall be the duty of the Governor, within—years after the passage of this act, to cause the positive standards herein described, to be referred to natural invariable standards, and to deposit in the office of the State Treasurer the authentic certificates of such reference, with the apparatus by which it was made. The length of the standard yard to be compared with that of the pendulum vibrating seconds at a certain and defined spot in the Independence Square in the city of Philadelphia or in some unalienable public property, at an ascertained and convenient temperature and pressure; all the circumstances of the comparison to be stated. The standard of weight to be compared with that of one hundred standard cubic inches of water, at its maximum density, and at a convenient atmospheric pressure.

AN ACT TO FIX THE DENOMINATIONS OF MEASURES AND WEIGHTS IN THE COMMONWEALTH OF PENNSYLVANIA.

TABLE OF CONTENTS.

Section 1.—Fixes the denominations of linear measure.
2.—Fixes the denominations of superficial measure.
3.—Fixes the denominations of liquid measure.
4.—Fixes the denominations of dry measure.
5.—Fixes the denominations of weight, which refer to the troy standard.
6.—Fixes the denominations of weight which refer to the avoirdupois standard.

An Act to fix the denominations of Measures and Weights in the Commonwealth of Pennsylvania.

Section 1.—Be it enacted by the Senate and House of Representatives, of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same: That the denominations of linear measure of this Commonwealth, whereof the yard, as heretofore provided, is the standard unit with the relations thereof, shall be as follows;

12	inches	make	1	foot.
3	feet	make	1	yard.
5½	yards	make	1	rod, pole, or perch.
40	rods	make	1	furlong.
8	furlongs	make	1	mile.

Section 2.—Be it further enacted by the authority aforesaid, That the denominations of superficial measure of this Commonwealth, whereof the square of the linear yard, as heretofore provided, is the standard unit, with the relations to said standard, and to each other shall be—

30¼	square yards	make	1	pole or perch.
40	square poles	make	1	rood.
4	square roods	make	1	acre.
640	acres	make	1	square mile.

Section 3.—Be it further enacted by the authority aforesaid, That the denominations of liquid measure of this Commonwealth, whereof the gallon, as heretofore provided, is the standard unit, with the relations to said unit and to each other, shall be—

4	gills	make	1	pint.
2	pints	make	1	quart.
4	quarts	make	1	gallon.
31½	gallons	make	1	barrel.
2	barrels	make	1	hogshead.
2	hogsheads	make	1	pipe.
2	pipes	make	1	tun.

Section 4.—Be it further enacted by the authority aforesaid, That the denominations of dry measure of this Commonwealth, whereof the bushel, as heretofore provided, is the standard unit, with the relations to said standard and to each other, shall be—

4 pecks to make 1 bushel.

And the minor divisions of the peck shall be its aliquot parts. Provided that the form of the dry measures shall be conical, that the diameter of the circle of the top of the measure shall be not less than one-twentieth greater than the diameter of the bottom of the measure, and the height not more than nine-twelfths of the diameter of the bottom.

Section 5.—Be it further enacted by the authority aforesaid, That the denominations of weight of this Commonwealth, whereof the troy pound, as heretofore provided, is the standard unit, with the relations thereof to said standard and to each other, shall be—

24	grains	make	1	penny-weight.
20	penny-weights	make	1	ounce.
12	ounces	make	1	pound.

Section 6.—Be it further enacted by the authority aforesaid, That the denominations of weight of this Commonwealth, whereof the pound avoirdupois, as heretofore provided, is the standard unit, with the relations to said pound and to each other, shall be--

16	drams	make	1	ounce.
16	ounces	make	1	pound.
25	pounds	make	1	quarter.
4	quarters	make	1	hundred.
20	hundreds	make	1	ton.

Bibliographical Notice.

The Elements of Mechanics, comprehending Statics and Dynamics, with a copious collection of Mechanical Problems, intended for the use of Mathematical Students in Schools and Universities; with numerous plates. By J. R. Young, *author of the Elements of Analytical Geometry, and Elements of the Differential Calculus.* Philadelphia, 1834, Carey, Lea, & Blanchard.

We cordially recommend this treatise by Mr. Young to the students for whom it is designed, as a work possessing decided advantages over others of the kind hitherto published in this county.*

We recommend it not so much for the numerous principles of mechanical science which it embodies, for the greater part of these may be found in other treatises, but for the excellence of the method pursued by the author.

The analytic method pursued by Mr. Young, has been too much neglected in the universities and academies in this country. This is owing to the deficiency of text books, and is the less surprising when we reflect that even in the land of Newton, his greatest admirers have admitted that the progress of invention in higher mathematics has been retarded by too close adherence to the synthetic method.

The principles of mechanical science may be illustrated by geometrical constructions, or by experiments with models, but neither of

* Since the above was in type, the reviewer has been favoured with the perusal of Prof. Courtenay's translation of Bucharlat's "Eléments de Mécanique," a valuable addition to American literature, of which notice will appear in a future number. Reviewer.

these methods is without limit in the extent of its applications. It is too often the case that the solution of one problem by a geometrical construction, gives no clue to the solution of the next; but there are more important reasons in favour of the analytic method; for it is our main support when experiment and geometrical construction fail.

Neither the natural spirit of inquiry, nor the demands of science, in modern times, can be satisfied with the limits to which these methods would confine us.

The earth, the common fulcrum of all our levers, pulleys, &c. must be divested of its character of fixedness, and must be regarded as assuming at each successive instant, a new position, to which it is never to return.

Here the ordinary methods of inquiry are found to be insufficient, theory and observation take the place of experiment, and the analytic method comes in to complete the solution of those problems in celestial mechanics which are beyond the reach of geometrical constructions.

This method is fully illustrated in Young's treatise, and in no other which has hitherto been placed before the American student.

The great principles of mechanics, those of the conservation of areas, of the direction of the centre of gravity, of the virtual velocities, those of least action, of living forces, those relating to axes of revolution, to stable and unstable equilibrium, are demonstrated in the clearest manner by Mr. Young, and are shown to be consequences of the dynamical formula by which the most complex system of bodies acted upon by external and internal forces, has, for any instant of time, its condition expressed by a single equation, based upon the principle of the lever, and resting upon evidence equally plain and conclusive.

The anxiety with which the student commences this department of science is removed, when he sees that by the genius of Mr. Young, those methods of investigation which have immortalized their inventors, and which have been generally considered as above the reach of ordinary minds, are rendered quite familiar, and are brought home to the solution of problems connected with the every day occurrences of life.

In making the highest departments of mathematics intelligible to ordinary minds, Mr. Young has excelled most other writers, and has conferred a lasting benefit upon the readers of the English language in every country.

We look forward to the time when the extensive use of Mr. Young's series of books in the universities and academies of our country, shall contribute in no ordinary degree to elevate the standard of mathematical science.

But let not the corporations who direct our universities, or the students for whom these courses are prepared, imagine that it is immaterial what algebra, what geometry of demonstrations or of position, what calculus is studied, so long as the analytical mechanics are brought forward to crown the course.

Though truth is one and indivisible, and though a demonstration can neither be made more nor less certain by the reputation of its author, yet a theorem which shall be indispensable in analytical mechanics, in the calculus, in the geometry of position, or in analytical geometry, may be sought for in vain in any other series but Mr. Young's.

It may be asked whether Mr. Young's course is yet complete—although enough has been done to secure him the gratitude of every lover of pure mathematics, it may be remarked that another volume —on the calculus of functions, on the summation of difficult series, on the differentials of difficult integration, with the substitutes that may be employed where definite integration fails,—a further illustration of the modes of solution of abstruse dynamical problems—with the employment of the calculus of variations, is in this country a desideratum. Something of the kind has been promised by Mr. Young, and none could so well as himself append this volume to his course. With such a course before us, and with the best edition of the celestial mechanics to be found in any language, should the highest department of science remain longer in neglect, the blame must be laid where every American student would be least desirous that it should fall.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN DECEMBER, 1833.

With Remarks and Exemplifications, by the Editor.

(Continued from p. 405, vol. xiii.)

51. For a *Machine for paring, quartering, and coring apples;* Cyprian C. Pratt, Paris, Oxford county, Maine, December 28.

There are two or three existing, or expired, patents for the paring and quartering of apples, and between these and that now presented to us there are several acknowledged points of resemblance; but these, the patentee says, he does not claim; all that is claimed being "the box, knives, tube, slide, and the peculiar manner of applying the power of the pulley and the lever for moving the slide to drive the apple through the knives and tube in coring and quartering it."

We do not think it necessary to give a particular description of the parts claimed, as the machine is only calculated to interest the few persons who make a business of preparing dried fruit.

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52. For the *Application of Steam to drive machinery;* John Lockwood, Sodus, Wayne county, New York, December 28.

The patentee states that he is a member of the Society of Shakers; a society existing without the marrying, or being given in marriage, of those who compose it. Now, as they do not beget sons and daughters, the continuance of their society depends upon the adoption into it of the children of others; and, were we to judge by

the specimen before us, the same system prevails in their mechanical contrivances. Many become members "after their passions have forsaken them;" but few, however, do so at an age so advanced as that of the apparatus which forms the subject of the patent before us, or the wandering Jew himself might appear among them as a stripling. This invention is no other than a steam engine, such as was put into operation by Hero of Greece. The steam is to be admitted through a hollow shaft, and is to pass off through two openings in arms, extending at right angles from the shaft, or rather through two openings in the periphery of a wheel placed upon the shaft. A sliding piece, fixed by a screw, is to be adapted to each of these openings, for the purpose of regulating the size of the aperture.

The Shakers deserve all praise for the neatness of their establishments, and the substantial excellence of the articles which they manufacture, and, undoubtedly, they may be able to make some contributions of a novel character to the useful arts; but we are not prepared to see the steam engine improved by any one who is not well acquainted with its history, and with its operation in the most perfect forms which have been given to it; and this knowledge, we apprehend, is not likely to be acquired in the libraries of the society to which the patentee belongs, or from the limited intercourse between its members and the busy world. At all events, the specimen before us is one of an "advance, three steps backward."

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53. For a machine for *Hulling and Cleaning Clover;* Elisha Rider, Livingston, Nelson county, Virginia, December 28.

A main cylinder covered with wire cards, is to be in great part surrounded by a hollow cylinder of perforated sheet iron. The seed to be hulled is carried between these by a revolving apron, and is to pass down an inclined board to a fan wheel. In the circuit of the seed, as it is acted upon by the main cylinder, it passes also between it and smaller cylinders, covered with cards, operating like the fancy cards of a carding machine. The claim is to the peculiar arrangement of the several parts of the machine.

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54. For a *Drawing and Forcing Pump;* John L. Sullivan, Civil Engineer, city of New York, December 28.

The apparatus here patented is said to be *a drawing* and forcing pump, connected with a boring for water, and called the city supply pump.

This pump is to be constructed like that described in No. 59, vol. 13, p. 325; that is, there are to be two chambers, with their pistons, connected with a single rising main. The pistons are represented as worked by racks and a pinion, precisely like that above alluded to. This pump is intended to be applied to raise water from borings in the ground, in those situations where the quantity supplied by the reservoir is greater than can be raised by a single pump.

"The principle for which this patent is claimed consists in a combination of drawing and forcing pumps, with a boring in rock or earth, made under, and according to the patents granted to Levi Disbrow."

55. For a *Thrashing Machine;* Samuel Clark, city of New York, December 28.

The cylinder in this machine is to consist of bars of square iron, secured, by riveting, to two iron heads: the concave, also, is to be formed of bars of iron; and particular directions are given respecting the *form* of the frame. The claim is to "the particular construction and form of the frame and cylinder as before described."

The lack of novelty may safely be inferred, when a claim is made to what is so unimportant as the form of the frame; and as to the cylinder, we could easily refer to one perfectly similar, were it worth while.

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56. For machinery for *Spooling Cotton Roving;* William H. Elliot, Leicester, Worcester county, Massachusetts, December 28.

The apparatus here patented is denominated the *double revolving speeder*, to distinguish it from the double speeder for which it is intended to be substituted, as producing a like advantage at a diminished expense. In this machine the spool has two motions, by one of which motions it is to twist the roving, and by the other to wind it upon itself when so twisted.

The spool is contained in a frame attached to a vertical revolving shaft, by the revolution of which, the twist above spoken of, is put into the roving. The apparatus for distributing the roving equally upon the spool, and producing the other motions required, cannot be explained without the drawing; from its apparent complexity, we should not suppose that it would attain the main object, that of diminishing the cost; the inventor, however, ought to be able to judge of this. He says, "all I claim of my invention is the double revolving motion of the spool."

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57. For an improvement in the *Process of Tanning;* Thomas W. Peachy, M. D., Williamsburg, Virginia, December 26.

(The specification will appear in the next number.)

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58. For *Preparing an extract of Bark for Tanning;* Thos. Rundlet, Bedford, Hillsborough county, New Hampshire, December 30.

We learn, *though not for the first time*, that if pulverized bark, of any of the kinds fit for tanning, be leached in warm or hot water, and the water be afterwards evaporated, "a substance, or gum, is formed;" this is the discovery; the application is the taking of this gum, or substance, dissolving it in warm water, and then applying the solution to the purpose of tanning. The advantages of this mode of procedure are set forth in the specification, but we apprehend that they are somewhat overrated, or they would not have been neglected by those interested, thousands of whom have been familiar with this *new* discovery.

59. For preparing *Hydraulic Cement;* Thomas F. Purcell and Alexander B. M'Farland, Williamsport, Washington county, Maryland, December 30.

One part of unslacked quick lime, in powder, and one part of good sand are to be mixed with hot, or cold, water enough to make them into mortar: sulphate of iron [copperas] is to be dissolved in the water used, in quantities varying from four ounces to two pound to each gallon; when a very hard cement is required, a portion of sulphate of manganese is to be added. The lime must be used very soon after it is prepared, as it sets quickly. The patentees claim to be "the first who have united and applied these ingredients to form an hydraulic or water cement, which will harden under water."

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60. For an improvement in *Stoves;* Jordan L. Mott, city of New York, December 30.

The claim made under this patent is to the "combining the open Franklin with the close stove, by connecting the grate, which is thrown back, by a plate, or plates, with the close part of the stove; the one stove being thus placed, as it were, above, or higher than the other."

The lower portion of this stove is to be in the form of the open, or Franklin stove, and is to contain a grate for fuel; the plates forming the exterior of it are to be continued up to any convenient height, and this upper part constitutes the close stove. There may be a pipe, from the top plate to carry off the smoke; and it is proposed to divide the close part into two compartments, by a soap stone partition, descending from the top plate, to a considerable distance down; the anthracite may be put through an opening in the top plate over the front division, and it will then fall into the grate; the front plate being curved inwards, so as to conduct the coals over the upper bar; this constitutes the principal novelty, and is the foundation of the claim.

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61. For a *Machine for Drafting;* James C. Moore, Richland, Belmont county, Ohio, December 30.

The instrument for drafting consists principally of a circle and a scale, with divisions, the description and mode of using which occupy a very large space, although the important information of what is claimed is omitted; the drawing too, which accompanies it, is without any written references. From our examination of the affair, we have come to the conclusion that it does not offer any special advantages, or contain any new principle.

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62. For *Bedstead Fastenings;* George Porter, Cincinnati, Ohio, December 30.

The fastenings described, like many which have preceded them, operate on the principle of the wedge, but in their form and mode of application they appear to possess novelty. All, however, that we shall do as regards this patent, is to give the claim, which is to "the

particular construction of the corner iron upon the post, its length being sufficient to embrace the whole thickness of the rail; with the form of the wedges, they being slightly curved, bring the bearings in the centre, thus rendering them less liable to break, and offering other advantages in the construction; the form and manner of inserting the irons in the rails, and the general arrangement of the whole for the attainment of the ends proposed."

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63. For *Constructing Cisterns;* George Tibbetts, jr., Jamesville, Onondaga county, New York, December 30.

A circular pit is to be dug, of such diameter and depth as may be required, and this is to be planked round with plank jointed in the manner of staves, the space between these and the ground being closely filled in. Hydraulic cement is then to be placed around on the bottom of the pit, so as to be in contact with the planking; upon this a second tier of plank is to be raised at the distance of one or two inches from the former; into this space, grout of hydraulic lime, either alone, or mixed with stones and gravel, is to be poured, so as completely to fill it up. Where water, lime, and stone are abundant, the space between the two plankings may be six inches. The inside of the inner planking is to be plastered with the hydraulic cement, and the top also, including both plankings, is to be securely covered with it, so as to exclude the air and moisture. The bottom of the pit is likewise to be thus plastered, then covered with stone, or brick, and grouted. The claim is to "the raising the two tubes of wood, and filling the space between with grout, or stone, or gravel, and grout, and excluding the air and water from the inner tube, whereby it is preserved from decay and the attacks of worms."

On the 19th of November, a neighbour of the present patentee obtained a patent for constructing cisterns, by applying the hydraulic cement to the earth, without the employment of any partition or walling; (see page 322, vol. xiii.) we think so little of these plans, as improvements, that we would not, were we in want of a cistern, accept of a right from either patentee, under the condition of using it. We do not like the intermixing the wood and the cement, being convinced that one of them will be likely to crack the other. A wall of hard brick, or of rough stone, laid in hydraulic cement, and plastered over, would be but little, if any, more costly than the plans in question, and although unpatentable, would be incomparably better than either of them. The idea of effectually protecting wood from the action of water, by an inch or two of water proof cement, is altogether fallacious.

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64. For an improvement in *Bricks, and the machinery for making them;* Thomas A. Sherman, Scriba, Oswego county, New York, December 30.

The title of this patent, as given in the petition, is, "an improvement in the composition of mortar for making bricks water proof and

fire proof; and also machines for mixing the mortar, for brick, and also a machine for moulding brick."

In mixing the materials, half a bushel of unslacked lime, and half a bushel of salt are to be added to every barrel of water employed; and this we are told, will make brick which will stand in fire and in water.

The grinding machine is a circular trough to contain the mortar, and within this is a roller consisting of six or more wheels revolving upon a shaft drawn round by a horse, and having its inner end properly attached to a vertical shaft. The wheels are to diminish in diameter, as they approach the centre, and each of them is to be covered with a hoop, or tire of iron. These wheels are placed a small distance apart, and iron scrapers, fixed upon bars, pass in between each of them, to scrape out the mortar. At each of these spaces other pieces of iron, like the coulter of a plough, descend down into the mortar, to cut and divide it as the wheels go round.

The machine for moulding, consists of a table, or platform, along which a carriage is to be drawn towards either end, by means of a crank, from the shaft of which ropes pass over pulleys. The carriage is to contain a mould for eight bricks, and when this mould is at the middle of the table, it stands between cheeks which rise a few inches above it, and form two sides of a hopper to receive the mortar; whilst two lids, each of which when down covers half the mould, form, when raised, the ends of the hopper; into this, clay enough is to be thrown to make the bricks, and on shutting the lids down it will be squeezed into the moulds; these being drawn forward, the lids operate as a strike; the mould is then to be removed, and a new one applied.

The inventor says—"I claim to have discovered the composition above described for making brick, and to be the inventor of the two machines above described."

By turning to the patent of Nathaniel Adams, at p. 386 of the last volume, it will appear that, so far at all events as the grinding or mixing machine is concerned, he is not the sole and entire inventor of it, and that his claim is, therefore, much too broad.

The moulding machine, as it is presented in the specification, appears to us to be a very imperfect instrument. No mode is described for regulating the quantity of mortar thrown in; for forcing down the doors by which it is to be made to fill the moulds; or to insure the regular distribution of the clay.

As regards the composition, we do not know what is intended by its producing a brick "which will stand in the fire," as it certainly will not stand as a fire brick; it would not be easy to make a composition for brick which would fuse more readily than that proposed; the alkali in the salt, and the quicklime mixed with the clay and sand of the original compost, will very readily run into glass.

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65. For *Steam Valves, Force Pumps, and Wheels for Locomotive Engines;* Stephen H. Long, Colonel in the United States

Army, and attached to the corps of Civil Engineers; city of Philadelphia, December 30.

The claims under this patent are to the construction and application of a *double slide valve*, for the purpose of interrupting the passage of the steam into the cylinders at half, or less than half, stroke. The adaptation and construction of a single valve chamber for the force pump, in which all the valves are situated one above another, there being any number of them which may be deemed desirable, as one, or more, suction, and one, or more, ejection, valves. The mode of connecting the valve chamber with the force pump, so that the water is first drawn into the pump through the valve chamber, and forced out towards the boilers, through the upper part of the same. The mode of attaching a hand pump to the valve chamber. The employment of double felloes for the wooden wheels of rail-road carriages, and the application thereto of circular hubs of cast iron, formed of one single casting.

The double valve consists of two separate slides, one of which is, like the ordinary slide valve, to admit the steam alternately into each end of the cylinder, the other is to cut off the passage of the steam into the steam cylinder at about half of every stroke of the piston. Without the drawings it would be extremely difficult to describe the particular mode of constructing and regulating the steam ways of these valves, as adopted by the patentee, and we do not think it necessary to make the attempt. The same remark will apply to the force pumps.

As regards the cast iron hubs, we are told that the improvement consists in the application to locomotive engines, of such iron hubs as R. Imlay, of Philadelphia, has applied to burthen and passage cars. This, we apprehend, is a claim which has no foundation whatever upon which to establish a patent. The taking a wheel, or a part of a wheel, invented by another person, and applying it to a carriage of another kind, is, certainly, not an invention or discovery. Mr. Imlay has not thought proper to take a patent for the hub in question, nor are we aware that there is enough of novelty in it to sustain one, but however this may be, the contrivance cannot be claimed by another.

The *double felloes* which compose the rim of the wheel, are to lap over each other so as to break joints, each being halved out at every spoke, so as, when put together, to form a mortise. The felloes are to be united by iron rivets passing through them, near to the joints; and before hooping, they are to be further secured by clamps of iron which cross them transversely, having a jog, or half head, turned down at each end to embrace the felloes. Over these is put the iron tire, and the bolts securing it on pass through holes prepared in them for that purpose.

We do not perceive in this arrangement any thing which is likely to obviate the difficulty experienced in keeping wood and iron tight together in locomotive engines and cars. The expansion and contraction of the wood from moisture and dryness; the oxidation of the

iron, and the sure effect of continued vibration, have hitherto destroyed junctures which were apparently so firm that no ordinary force could affect them; we shall be glad to learn that such is not the case with those made upon the plan here proposed.

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66. For an improvement in *Butt Hinges for Tables;* Humphrey Treadwell, Hyde Park, Dutchess county, New York, December 31.

This is not properly a butt, but a table joint hinge; it is intended as a substitute for the rule joint of dining, breakfast, and other tables, and is so made as to extend along the whole length of the leaf, and to show a quarter round of metal instead of wood. Its form may be readily conceived by supposing the half of a butt hinge to have the wire tube extended from end to end, without being divided into separate knuckles, and that there were as many of these half hinges as would extend along the whole joint; the leaf and bed of the table are then to be rebated and hollowed so as to receive the strap of the hinge, and one half of the barrel, or tube; when this has been properly done, on screwing the half hinges alternately on the bed and the leaf, so as to form close joints, this part of the work will be finished, and the leaf, when down, will show a small, continuous, quarter round of metal.

It is proposed to make these hinges of sheet brass, by bending the separate pieces over a wire, in which case the strap part will be double; and this, probably, will be the best way of forming them; the patentee, however, does not confine himself to this method, but claims the general construction of such hinges, whether made of cast or of sheet metal.

We think the plan a good one, as the appearance of the joint will be neat, whilst its strength will be much greater than when made in the old way. It will be somewhat, but probably not much more costly.

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67. For a *Coffee Roaster;* Amos Ransom, Hartford, Hartford county, Connecticut, December 31.

The part to contain the coffee may be in the form of a common iron pot, to which is to be fixed a framework of iron, that will sustain a vertical shaft, having knives, or scrapers, at the bottom of it, which are to revolve nearly in contact with the bottom of the pot. On the upper end of this shaft there is to be a beveled wheel, and into this gears a similar wheel which is to be turned by a handle on the end of a horizontal shaft. This constitutes the whole invention, and as it is not quite so good as, and probably no cheaper than, the well known cylindrical roaster, it does not bid fair to be very extensively used.

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68. For an improvement in *Rail-road Cars;* Abel Look, Waterford, Saratoga county, New York, December 31.

This device consists in making each wheel fast to a separate axle, the inner end running in bearings under the centre of the car, and

the outer end in the frame work, outside of the wheel. The object is said to be, the enabling the car to run with facility upon a curved as well as on a straight road. In speaking of this mode of construction the patentee says, "I am aware that in rail-road cars the axles have been so made as to allow one wheel to turn thereon, whilst the other was made fast, the axle being allowed to revolve; I am also aware that it has been proposed to make the wheels of common carriages, or wagons, each fast to its own axle, the axles turning in suitable bearings; but the adaptation of wheels, each fastened to its own axle, to rail-road cars, in the manner, and for the purposes herein described, I claim as new, and as my own invention; and it is for this, specifically that I ask a patent."

We do not perceive any difference in the effect to be produced by this plan and that which results from the allowing of one wheel to be loose on the axle; it may also be doubted whether there is enough of novelty to sustain a claim to a patent in the mere adoption of a known method of fixing wheels, in the construction of rail-road cars.

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69. For an improvement in *Coach Steps;* Charles M. King, Newark, Essex county, New Jersey, December 31.

The joints of coach steps, as usually constructed, depend for their strength upon a single projection across the end of each side piece; and as the force to which they are subjected is frequently very considerable, this is apt to give way. The patentee makes his steps with a double bearing. In addition to that across the back ends of the horizontal side pieces of the upper step, which rest against the back ends of the perpendicular pieces to which they are attached, he makes strong projections from the back edges of the perpendicular parts, to receive the upper ends of the projections on the horizontal pieces; a step thus made cannot give way unless both bearings should break at the same time. The middle and lower joints are constructed upon the same principle.

These projections constitute the only difference between these and other coach steps, and comprise the whole claim.

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70. For a *Lath Cutting Machine;* James Mead, and Aaron W. Pearson, executor of Willis Pearson, Lebanon, Warren county, Ohio, December 31.

By the description, it appears that the laths are to be cut from a round log, by means of two long knives, one of which is to cut the sides and the other the ends of them. The log is to be hung upon centres, and the two knives are to be worked by levers attached to a shaft, having two cranks upon it, moving one of the knives vertically, and the other horizontally.

The specification is written with intelligence, but still it is defective in not giving a clear description of the machine; we see enough of it, however, by the aid of the drawing to doubt of its ever producing a lath. The knives are straight, and must not be less than four feet in length, and one of them is to be pushed in upon the periphery

of a solid log, so as to cut a lath. The power required to effect this, and to hold the log whilst it is done, would be immense, unless logs could be found as soft as cheese.

As the cutting is to be in a spiral, from the surface to the centre, there is a contrivance for raising the log as the laths are cut. There is some skill manifested in the mode proposed for effecting this, and in other movements, but we really think it altogether misdirected.

There is no claim made, and we apprehend that if the machine performs its office, it is sufficiently original to sustain itself as a whole.

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71. For an improvement in the *Balance;* Benjamin Morrison, Milton, Northumberland county, Pennsylvania. Patented February 13th, 1833. Patent surrendered and reissued December 31.

The form of the specification and of the petition in the case before us, gives no indication of the surrender of the former patent, no allusion whatever being made to it. The law, it is true, does not prescribe any particular form for reissued patents; still, it would seem necessary, from the nature of the case, to state in the new petition what had been done, and the reason therefor. As, however, the former patent has been cancelled at the office, we presume that the new one would be good in law, although the form of obtaining it may have been defective.

The general tenor of the new specification is the same with that upon which the patent was originally issued, but there is now a claim added to it in the following words—

"What I claim as new, and invented, discovered, or applied by me, are the pendulum rods and weights attached thereto, as also the rings in which the dishes set, connected with the pendulum rods, and the mode of applying the same to the beam."

Our remarks on the former patent may be seen at p. 92, vol. xii. and we know of nothing to induce us to vary them; the things claimed we do not consider real improvements, as the weights permanently suspended to the scales must lessen their sensibility, and at the same time render it necessary that they should be fixtures.

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72. For an improved *Cooking Stove;* William Shaw, Albany, New York, December 31.

This stove is represented in the ordinary square, or, rather, parallelogram form, and has folding doors in front which enclose a grate for anthracite; at the back of the grate there is to be an oven, one portion of the draft passing above, and another below it, to a smoke flue. The patentee claims "the general form and construction, as specified, and the particular mode of producing and applying heat, as being essential to, and making the ground work of, the improvement." We do not see any think in the "general form," or in the "particular mode of producing and applying the heat," by which to distinguish this stove from some, and indeed from many, others.

73. For an improvement in the construction of *Bedsteads;* Isaac Eaton, Mount Gilead, Loudon county, Virginia, December 31.

The object of this invention is to tighten the sacking bottom with facility, and to convert a low into a high post bedstead, for the hanging of curtains. The description, as given, appears somewhat formidable, but the result does not correspond thereto. The sacking is to be tightened by making one of the side rails revolve, applying a rag wheel and pall at the ends to keep it in its place. The posts are to be lengthened by inserting two stout wires in the top of each of them, one of which is to pass straight up to the tester, and the other to reach it in an oblique direction, so as to form a brace.

The claim is to the "constructing of bedsteads, by which the sacking bottom can be strained with a single revolving rail; and the curtain frame sustained by the iron braces."

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74. For a machine for *Extracting Stumps and moving heavy bodies in constructing roads, &c.;* Elias Fraser, Hector, Tompkins county, New York, December 31.

Those persons who have seen the hook at the end of a lever, or beam, for rolling and turning logs at a saw mill, have seen something bearing a strong resemblance to this machine. A beam of wood sufficiently strong for the intended purpose is to be prepared, and at a convenient distance from one end of it a mortise must be made through to receive a hook, or claw, like those alluded to, and like them it is to be kept in its place by a pin. A second hook is to be attached to the beam by means of links, a little back of the former; and when a stump is to be removed, one or both of these hooks are to be attached to it, and "team power" applied to the beam to drag it from its place. On one side of the beam there may be a blade, or share, projecting a short distance, to lay hold of articles too small for the hooks. We are told, in conclusion, that when the stump refuses to yield on being pulled, the force may be applied by a circular movement of the team.

There is no claim.

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75. For a machine for *Splitting Leather;* Joseph P. Shaw, and John C. Briggs, Boston, Massachusetts, December 31.

This machine appears to be intended for reducing strips of leather to a proper thickness, by drawing them between a knife and a straight piece of metal parallel to the knife, and at such distance from it as shall be equal to the thickness intended to be given to the leather; in its general construction, therefore, it is similar to other machines intended for the same purpose. The improvement claimed consists in a spiral spring that bears down the ends of the straight bar, which, when the leather is to be introduced, is raised up by a lever for that purpose. But one mode, and that a peculiar one, of fixing such springs is alluded to, and the claim is confined to "the manner as above de-

scribed," which springs may be applied in various other ways, equally good with that set forth.

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76. For an improvement in the construction of *Friction Rollers*, to be applied to machinery of various kinds; Benjamin Stancliffe, city of Philadelphia, December 31.

The friction rollers here patented are intended as an improvement upon those of Garnett, and it is proposed to apply them to the axles of carriages and of cars for rail-roads, as well as to many other kinds of machinery. It is observed that the friction rollers, as heretofore employed, have been applied to the axis only, whilst in carriages, cars, &c. there is frequently a great lateral thrust, and consequently a very considerable friction upon the shoulders, which has never been provided for; the patentee, therefore, places friction wheels bearing on the shoulders, in addition to the rollers acting on the sides, of the axle.

The claim is to "the application of friction rollers with their axes at right angles to each other, so as to cause them to bear laterally, as well as directly, upon the axles and boxes of machinery, upon the principle herein set forth, whether they are constructed in the manner described, or in any other involving the same principle."

There may be cases, but they are very few, in which such rollers may be of advantage; we have several times had occasion to remark that wherever there is any jolting in the motion of machinery, Garnett's rollers have, after a little wear, been found worse than useless; there is nothing in the plan before us, to lessen this objection, and as the end rollers must have an extremely narrow bearing, they will, in such cases, fail before the others. We deem them specially inapplicable to cars and carriages.

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77. For a *Cheese Press;* Asahel Tyrrill, Fowler, Turnbull county, Ohio, December 31.

This press is to be made with two cheeks, a bed, and a follower, like the ordinary screw press. The cheeks are to be grooved to receive two cast iron pieces which project up from the follower, and to slide in them. These have each teeth on one side, forming a rack; and a cast iron shaft, or roller, extending from cheek to cheek, has a pinion on each of its ends, taking into these racks. A hole through the middle of the roller receives a lever by which the follower may be raised, or forced down; and when the cheese is under pressure, a weight at the end of this lever serves to render it continuous. The claims are principally to the making of certain parts of cast iron, as "the cast iron boxes, or grooves—the cast iron roller, with the cogs cast solid on each end—the cast iron follower, with the cogs cast solid thereon." We think that such claims are altogether unsubstantial, referring neither to invention, or discovery, but merely to the employment of a particular and well known material.

78. For an improvement in the common *Cotton Spool, or Bobbin;* Nathaniel Rider, Milbury, Worcester county, Massachusetts, December 31.

It is stated, that the bobbins of wood as usually made, have an unequal and too great friction upon the spindles, the friction occasioning the bobbin to go sometimes too fast, and sometimes too slow, and frequently causing the breaking of the thread. The patentee, instead of making the boxes of the bobbins of wood, intends to form them of metal; these metallic boxes not being so deep, or thick, as those made of wood, the bearings and friction are consequently much diminished, and the bobbin follows the spindle with a more easy and uniform motion; this motion, too, may thus be greatly accellerated, allowing, as it is said, of the spinning of almost double the quantity of yarn. The improvement claimed is confined to "the introduction of metallic boxes into the bobbin used in spinning cotton warp, yarn, or twisting cotton thread."

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79. For *Ceiling Ships and other Vessels;* Andrew M. Frink, New London, Connecticut, December 31.

(See specification.)

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80. For a *Door Latch, or Latch and Bolt;* Philos Blake, Eli Whitney Blake, and John Adams Blake, New Haven, New Haven county, Connecticut, December 31.

This invention is said to consist in a latch and bolt of a new and improved construction, intended as a substitute for a mortise latch, or mortise latch and bolt, and is denominated the *Escutcheon Latch*, or *Escutcheon Latch and Bolt.* The latch is made much in the manner of the spring bolt of a lock, but the shank which goes within the door is made round, to receive a spiral spring, by which the bolt is to be protruded. The bolt passes through a square hole in a plate on the edge of the door, and it is to be let in by boring a round hole in the centre of the rail; to receive it, and the spring which surrounds it, at the inner end of the shank a screw is cut to receive a piece of metal which is to be placed thereon. A round hole of about an inch and a quarter in diameter, is to be bored through the door, with its centre exactly opposite to the centre of the bolt. This forms what is called the chamber, and is to receive the tumbler, and the other parts to which the knobs on each side of the door are connected, and by means of which the bolt is to be turned. This chamber is to be covered on each side of the door by an escutcheon, of sufficient diameter to allow of its being fastened by screws. The particular construction of the part concerned in operating upon the latch, within the chamber, could not be made plain without the drawings, or the extension of this article to a greater length than would be convenient.

The claims are to the "supporting and guiding the interior end of the latch by the tumbler, either *directly*, or *indirectly*, through the

medium of a rocker. The supporting the tumbler exclusively by the escutcheons. The attaching the knobs directly to the tumbler, without the introduction of what in common locks is called the *spindle.* The conformation of the several parts, by which they are respectively adapted to the peculiar construction referred to. The fastening the door by a thumb bolt to the tumbler, to prevent it from turning on its axis."

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81. For a machine for *Hulling Clover;* Israel Correll, Shanesville, Tuscarora county, Ohio, December 31.

There is to be a cylinder coated with emery, and a concave, which is to be regulated by screws to keep it at a proper distance; the feeding is to effected by an endless apron; and the patentee says that "all the above improvements are relied on;" and certainly if long experience will enable us to rely upon any thing, he is correct, as the same methods have been adopted, and varied in different ways, by others, through a series of years; and although this may not contribute much to the security of exclusive possession, it will justify the implied confidence in the goodness of the machine.

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82. For a *Churn;* Iram Brewster, Blenheim, Schoharie county, New York, December 31.

A shaft having four cranks upon it is to work four dashers, in the common upright churn. Should any one chose to employ either three or five dashers, they will steer clear of this patent, and we doubt the danger of using the intermediate number.

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83. For a *Churn;* Uriah L. Clark, Menor Township, Lancaster county, Pennsylvania, December 31.

Although we have given to this instrument the brief name of churn, it has received from the patentee the more sonorous and circumlocutory appellation of "an improvement in the useful arts, being a machine for churning butter from cream, or milk, entitled Clark's improved churn." If the patentee had contrived a machine by which he could churn butter from another, and cheaper fluid, than cream, this, indeed, would have been an improvement in the useful arts, but that of making butter will be left pretty much in the state in which it existed previously to the introduction of the present *improvement,* which consists, simply, of the common barrel churn, with revolving dashers. According to the terms of the specification, however, "the vessel to contain the cream may be made of tin, sheet iron, or wood." The shaft, too, is to be made of iron, and is to be turned by a crank, and the churn may stand upon four legs. "The dashers are made of thin pieces of board, with an oblong opening in the centre of each." There is likewise to be an opening in the top of the vessel to admit of putting in the cream, and of removing the butter; and "the *inven-*

tion here claimed consists of the above described machine, or apparatus, for churning butter, with the arrangement of its several parts."

Our confidence in the general intelligence of the American dairy maids is such, that we omit the account given of the "operation" of the said machine, leaving this to be discovered by themselves.

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84. For *India Rubber, Water Proof, Mail, and Traveller's Bags;* Edwin M. Chaffee, Roxbury, Norfolk county, Massachusetts, December 31.

Cloth of any suitable kind, which has been coated on one side with India rubber, is to be cut so that two pieces when put together, shall form the intended bag. They are to be placed together, with the india rubber coating outwards, their edges coinciding, and are to be united by a strip of cloth coated with India rubber on both sides, which strip should lap half an inch or more on each piece. This first bag is to form the lining, which is to be covered with stout cloth of a similar form, but somewhat larger, and coated on both sides; when the two are firmly cemented together, the bag is so far complete, and is ready to receive a metallic rim, or clasp, of any convenient construction, which may be secured by a lock.

The "claim is to the construction and mode of manufacturing water proof bags, from India rubber cloth as above described."

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85. For *Water Wheels;* Zerah Blakely, Wilkesville, Gallia county, Ohio, December 31.

The buckets are to be placed around a solid shaft, in a form resembling the teeth of a rag wheel. Thus, suppose the shaft to measure seventy-two inches round, and that there are to be eight buckets; eight pieces of plank, each nine inches long, nine wide, and three thick, are to be made into a wedge like form, excepting that the sides which are to be outwards, should be made somewhat convex. The shaft is then to be made eight square, for the width of the buckets (nine inches,) and these are to be planted on. The face of each bucket, upon which the water is to strike, will then be nine by three inches; and the opening for the water will be three inches wide. The buckets are to run in a circular curb, which may extend one-fourth of the way round the shaft. Some variations in the manner of fixing the buckets are described in the specification, but being entirely unable to comprehend their use, we do not think it worth while to particularize them.

The drawing represents three such wheels on one long shaft, and we are told that there may be any number, and that they may be placed either vertically or horizontally. The patentee says, "I claim the particular improvement in the water wheel above specified." We are apprehensive that the wheel upon which this is an improvement, must be a very bad one, such a one, indeed, as could not easily be made worse. The way in which, in its present improved form, it is to attain the object of "preventing the

great loss of power occasioned by back water," we leave for others to discover.

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86. For an improvement in the *Structure and Action of the Piano Forte;* Alpheus Babcock, city of Philadelphia, December 31.

This improvement is said to consist in three particulars; first, in the arrangement by which the motion of the key is communicated to the hammer; secondly, in the preparation of the hammer: and thirdly, in the arrangement of the damper.

In the first part, the invention claimed consists in the novelty of the particular arrangement of the respective parts, and not to any of them individually. We might, probably, without the drawing, describe this part of the action so that it would be understood by a competent workman, but it would not be easy so to do, and the description would not interest any other person; it is perfectly well represented in the drawing, and clearly described.

In preparing the hammer, the piece of wood which is to be covered with the leather to strike the string, is made concave, to receive a small roll, or pad, of woollen cloth, or other suitable material, over which the covering of leather is to be placed in the usual way.

The claim is to "the substitution of cloth for the layers of leather heretofore used." The advantage of this is said to be that the uniform and regulated hardness given to the roll, particularly when of cloth, renders it more perfectly elastic, and prevents its indentation and hardening by use.

The wire which raises the damper rests upon the inner end of the key, by which it is raised; but its gravity alone is not depended upon to cause it to descend, its tendency to do so being aided by a slight lively spring, placed under the key, in such a way as to act on the lower end of the damper.

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87. For *Rollers for Rolling Iron and other metal;* Rufus W. Bangs and Stebbins D. Walbridge, Bennington, Bennington county, Vermont, December 31.

The patentees inform us that their improvement consists in the construction of rollers by which metal may be rolled of a given width, and of a regular taper from end to end, adapting it to many purposes, such as carriage springs, plane irons, &c. To regulate the width the driving roller is to be grooved, and to regulate the thickness, the groove must be sunk, or the roller made eccentric, so as to produce the intended effect.

There is no claim made, and as there is nothing novel in the plan, there was no room for one. We have had occasion to speak of such rollers repeatedly, and their operation is so obvious that any one proposing to offer them to the public as a new invention, might well pause before doing so, although he had not been so situated as to be actually informed of their previous employment. The world is large;

there are many ingenious heads and skilful hands at work, under the strong stimulus of interest, leading them to devise the best means of facilitating the operations in which they are engaged; and it is of no avail to a patentee to say that he did not know of the previous existence of the thing which he has patented, as the law does not intend to give him an exclusive right in consequence of his ignorance.

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88. For *Fireplaces, or Stoves;* John E. Cayford, Milburn, Somerset county, Maine, December 31.

The object in view in this patent is the construction of an open fireplace, for cooking, and heating rooms, by means of a small quantity of fuel; and we are told of many things which *may* be done in furtherance of this object; as, for example, that the fireplace may be made of cast or sheet iron, or of brick, or in part of one, and in part of another of these materials; and that there may be an oven, &c.&c. Among the things most important to be told in a specification, however, is what the patentee has invented; a thing, it is true, very frequently omitted; sometimes, no doubt, because the necessity of it is unknown, and sometimes because it would be impossible, which, it must be confessed, is a pretty good reason, and one that, we think, would fully apply in the case before us.

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89. For a *Machine for reaping Grain;* Obed Hussey, Cincinnati, Hamilton county, Ohio, December 31.

The mowing machine here described is to run upon wheels attached to the frame or carriage, in front of which the horses draw. From one side of the frame, a platform extends out several feet, say five or six, and upon the front edge of this is placed the apparatus for cutting the grain; which, as it is cut, is to fall upon the platform, whence it is to be gathered into bundles. The platform is sustained at a suitable height from the ground by means of a wheel, or roller, under the back part of the machine. The cutting apparatus consists of rows of fixed and of vibrating teeth, the fixed teeth being, in the specification, called the guard. These teeth are to project forward from the front edge of the platform, are to be seven or eight inches long, and three inches apart; they are nearly straight, but pointed towards their ends, and in their whole appearance resemble a large comb, or rake. The guard, or comb is double, being formed of two plates of metal, but the teeth are united at the points; it is, therefore, like two combs placed one above the other, at a small distance apart, their only connexion being the joinings of the points of the teeth. In the space between these teeth the cutting instrument is placed, and is made to vibrate; this is formed with teeth like those of a saw, but having each edge made sharp; the points of the teeth are at the same distance apart as those of the guard.

The main wheels of the machine are made fast upon the axle, upon which there is a toothed wheel so geared into other wheels as to give motion to a crank which vibrates the cutters between the guard teeth; as the machine is drawn forward, therefore, the grain, or grass, is

embraced between the teeth of the guard, and is cut off by the vibration of the cutters, it then falls back upon the platform.

"In this machine the following points are claimed as new and original. 1st. The straight horizontal saw, with the teeth sharp on their two sides for cutting grain. 2nd. The guards, forming double bearers above and below the saw, whereby the cutting is made sure, whether with a sharp or dull edge; the guards at the same time protecting the saw from rocks or stones, or other large substance it may meet with. 3d. The peculiar construction that the saw teeth may run free, whereby the necessary pressure and consequent friction of two corresponding edges cutting together, as on the principle of scissors, is entirely avoided. 4th. The peculiar arrangement by which the horses are made to go before the machine, and the general arrangement of the parts as above described."

On the 3d of May, 1831, W. Manning, of New Jersey, obtained a patent for a machine for cutting grass and grain, see vol. viii. p. 195, essentially like that now patented. The comb, it is true, is not double, in that machine, but this is not a point of importance; the cutters are perfectly similar, and are made to vibrate upon the comb. The first claim, therefore, in the present patent necessarily falls to the ground, and with it the whole superstructure. The claim in the first patent is to "the combined action of the teeth and cutters." We are not quite sure that the double teeth are an improvement, as there will be much danger of stubble insinuating itself within, and obstructing them.

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90. For *Supplying Steam Boilers with Water;* William W. Van Loan, city of New York, December 31.

The apparatus here patented is intended to keep the water in a boiler uniformly at the proper height, and to afford the means of ascertaining that it is so.

The apparatus described by this patentee is arranged with considerable skill, and looks, in the drawing, as though it would answer the intended purpose; where, however, there is an array of valves, pistons, stop cocks, &c. to be acted upon under the influence of high pressure steam, things do not go on so quietly and uniformly as might be desired; contraction and expansion, adhesion, the introduction of air, the insinuation of steam where it was not designed to go, the destruction of packing, the defect of lubrification, and the many other ills which such a machine is heir to, defeat the most exact calculations, and the most ingeniously arranged contrivances. Under these circumstances, therefore, we are never safe in pronouncing favourably of the practical operations of an untried project; nor, indeed, will those who are well informed upon the subject of mechanics, be very ready to do so in machines of much less complexity than the steam engine.

Should the apparatus be found to answer in practice, we will hereafter present to our readers the whole description, with the necessary figures; but, without the drawings a particular description cannot

be given. The general principle upon which the patentee has proceeded is the same upon which several other contrivances for a like purpose have been dependent, but the present is sufficiently novel in the arrangement of its parts, not to interfere with them; this principle is the equality of the pressure exerted by the steam in the upper, and by the water in the lower, part of the boiler, in consequence of which, when water in any vessel is subjected to the pressure of both, it will flow therefrom as it would if not subjected to the action of either. One of the instruments proposed to be used is so simple that its action will be readily understood. It is merely a large tube, opening into the boiler just at the water line, and furnished with two stop cocks, placed at such a distance from each other as to allow of a proper supply of water for a single stroke of the engine to be contained between them. The keys of these cocks are connected by a rod so that when one is closed, the other is open. When the outer cock is opened, water may flow into it from a reservoir, and when it is closed, and the other opened, this water may flow from the tube into the boiler.

The claim made is "to a combination of apparatus operating upon the principle described, in such manner as to be self-acting; and the application of said combination to a purpose that has not hitherto been accomplished, namely, to the feeding of boilers containing steam, and effecting this feeding in exact proportion to the waste of water by evaporation, even at times when the engine is at rest, or to boilers to which no engine is attached."

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91. For *Heating Air to be conveyed to Fires;* William H. Miller, Hindsdale, Cattaraugus county, New York. December 31.

This is one of those affairs with respect to which it is perfectly convenient and proper to omit every thing which would bear the appearance of a claim, as the apparatus patented differs about as little from some which have preceded it, as two instruments for the same purpose, and intended to be alike, usually differ, when made by different hands. Under the name of forge backs, we have described several similar contrivances, as may be seen by turning to p. 165, vol. x., p. 380, vol. xi., and other places which it is not necessary to point out. The first of these manifested an acquaintance with the subject, and skill in carrying the principles into effect; those which have succeeded it have been uniformly inferior to it although they were called *improvements*.

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92. For a *Suction Pump*, called the Bellows Pump; Allen H. Mathes, Madisonville, Monroe county, Tennessee, December 31.

The kind of pump here patented is described in most of the books treating upon hydraulics; we could find it in, at least, a dozen works upon our own shelves, and have had occasion to refer to it several times in our Journal. In illustrating the nature of the common pump, we have cited it both in lectures and in conversation, and hundreds of others have done so before us. To make a pump like the one here

patented, all that is necessary is to add a valve, opening outwards, to the nozzle of a pair of bellows, and to place round the valve, or click hole, on the lower board, a tube which shall descend into a vessel of water. On working the bellows, you will blow out water instead of air, and possess a perfect "bellows pump."

93. For a *Straw Cutter;* John M. Tilford, Rutherford county, Tennessee, December 31.

A cylinder, having a cutting knife placed obliquely along it, is to be made to revolve against the end of a cutting box. Upon one end of the cylinder there is to be a fly wheel, and upon the other a crank, or whirl; the straw is to be fed by hand, with the kind of comb, or rake, usually employed for that purpose. Who was the *first inventor* of such a machine, it would in these days be difficult to tell.

94. For a *Pulp Sifter;* Sydney A. Sweet, Tyringham, Berkshire county, Massachusetts, December 31.

Instruments for the purpose to which that before us is applied, have been usually called *pulp dressers.* That now patented is very simple in its character, operating like the common sieve. A plate of metal is to have slots or openings made through it, of such width as will permit the finely ground pulp for paper to pass through, whilst it will detain the knots and lumps which may exist in it. This plate is to be surrounded by a wooden frame, of such height as will allow the prepared pulp to be passed into it, and to this strainer is to be given a jarring motion up and down, by which it is to be made to strike upon any hard substance. The mode of filling it with the pulp, and of giving to it the requisite motion, is left to the determination of the user, as it is stated that these things may be effected in various and obvious ways.

The claim is "to the before described manner of constructing the horizontal pulp sifter, and the mode of operating it for sifting or dresing pulp for the manufacture of paper."

95. For *Making Hoops;* Moses Granger, Utica, Oneida county, New York, December 31.

All that is prescribed in this patent, is the cutting of stuff to be made into hoops, from the surface to the centre of a round log, so as to cross the growth of the wood, or what in this specification is called the *racking grain.* No particular machinery, or manner of cutting, is claimed, but simply the principle of sawing the timber for hoops in the direction specified, as regards the grain. A round log, it is said, may be taken, and two or three boards sawed from the centre of it, thus dividing it into two parts; these parts may then be turned down and sawed into quarters, taking away two or three boards as before; and in like manner the whole is to be cut up. When the stuff is so cut, it is stated that the hoops will bend with greater uniformity than usual, and with scarcely any waste of timber.

We must leave the makers of flat hoops to judge of the originality

of this invention, as we are not sufficiently well acquainted with the history of this art to form a decisive opinion in the premises. All we know about it is, that we have frequently seen hoops made of wood crossing the growth, but they were probably rived, and not sawed, from the surface to the centre.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for an improvement in the process of tanning hides and skins. Granted to THOMAS G. PEACHY, *city of Williamsburg, state of Virginia, December* 28, 1833.

To all whom it may concern, be it know that I, Thomas G. Peachy, of the city of Williamsburg, in the state of Virginia, have invented an improved mode of procedure in the process of tanning hides and skins by which the time required for that operation is abridged, and the apparatus employed much simplified; and I do hereby declare that the following is a full and exact description of my mode of procedure:—

I form the skins into bags by sewing their edges together, leaving an opening for the introduction of the tanning liquor, which opening is supplied with a nozle, tube, or other contrivance, having in it a stop cock, or valve, and capable of being attached by screwing, or otherwise, to a forcing pump, by means of which the tanning liquid may be injected into the bag, so as to exert any degree of pressure that it is capable of bearing. The liquid thus forced in will ooze through the skin, or hide, to be tanned, the spent liquid evaporating, or dropping, from the outside thereof, whilst a new and saturated portion is constantly supplied from the inside, until the process is finished, which in hides or skins of moderate thickness, may be effected in from twenty-four to forty-eight hours.

Instead of making the skins into bags in the way described, frames may be prepared between which the edges of two skins may be pressed and held firmly together, and the tanning liquid may be forced between them in the manner before described, or the skins may be connected together in any other way that will answer the same end. When the skins of animals are taken off, as they may be, without opening them in the usual way, they may then be made into bags with the utmost facility, and much trouble be thereby saved.

A single forcing pump will answer for any number of skins, as by means of the nozle, or tube, they may be attached and removed at pleasure, and the pressure be thus renewed, whenever it becomes necessary.

I am aware that skins have been made into bags, and confined between frames, in the manner herein described, and that they have been filled and distended by hydrostatic pressure, by means of long tubes, so as to produce effects in some respects analogous to those obtained by me. I do not, therefore, claim to be the inventor of the

application of tanning liquor to the inside of bags formed of one or more skins, this having been heretofore done; all that I claim as my improvement being the employment of a forcing pump instead of hydrostatic pressure made by means of a column of the tanning liquid.

THOMAS B. PEACHY.

Specification of a patent for an improvement in the mode of ceiling ships and other vessels. Granted to ANDREW M. FRINK, *New London, Connecticut, December* 31, 1833.

To all whom it may concern, be it known, that I, Andrew M. Frink, of New London, in the state of Connecticut, have invented an improvement in the mode of ceiling ships and other vessels, by which their strength is greatly increased, without necessarily increasing the quantity of timber used in their construction, and I do hereby declare that the following is a full and exact description thereof:—

The practice heretofore followed in ceiling ships and other vessels has been to allow the ceiling plank to run fore and aft of the vessel; instead of which I attach the ceiling to the timbers diagonally, and use two thicknesses, making them cross each other at such angles as I may deem most convenient; as, for example, at an angle of forty-five degrees, more or less. When used between decks I take care that the planks butt closely to the deck, or other timbers, at each end; as upon their so doing the stiffness or stability which they communicate to the vessel, in a great degree depends.

The parts which should be thus ceiled, will depend upon the nature of the vessel, and the uses to which she is to be put; a vessel may, manifestly, be so ceiled throughout, or only in such parts as may be preferred.

What I claim as my invention, and for which I ask a patent, is the placing of the ceiling plank of vessels diagonally, in the manner, and for the purposes herein described.

ANDREW M. FRINK.

ENGLISH PATENTS.

To CHARLES TERRY *and* WILLIAM PARKER, *merchants, for their invention of improvements in making or refining sugar. Sealed June* 26,1833.

The patentees describe their invention to be, first, in preventing, or diminishing, fermentation in the process of making sugar, and in the process of refining sugar, by the use of what they call ferrocyanic acid for that purpose; and, secondly, in the process of either refining or making sugar, promoting and increasing that effect called crystallization, and producing larger quantities of sugar by the use of sulphuric acid for that purpose.

The patentees further describe their invention as follows:—"We use three solutions, hereinafter described, and called, for the sake of distinction, solution No. 1, solution No. 2, and solution No. 3.

For solution No. 1, take ten ounces avoirdupois of crystallized sulphate of zinc, and dissolve it in three gallons of cold water, then add three ounces measure of sulphuric acid, specific gravity, 1.845. This is sufficient for one ton raw sugar.

"For solution No. 2, take nineteen ounces avoirdupois of best Prussian blue, in powder, and six ounces and a half avoirdupois of unslaked lime, also in powder, and thirteen and one-third pints imperial measure of distilled water. Digest them together at a moderate heat, say 120° of Fahrenheit, in an earthen vessel, gently stirring this mixture with wood until all the blue colour has disappeared. Allow the whole to stand till it is cool, and then filter it. This liquid the patentees call, ferrocyanate of lime; it should be brought by concentration, or dilution, which ever may be requisite, to specific gravity 1.020. When at 60° Fahrenheit, ten pints imperial of this liquid is sufficient for one ton of raw sugar.

Solution No. 3. Take ten ounces, avoirdupois, of crystallized sulphate of zinc, and dissolve it in five gallons of cold water; then add five ounces measure, of sulphuric acid, 1,845; this is sufficient for one ton of green sirops, or molasses, with or without a mixture of sugar, to which, respectively, this solution is to be applied, as hereinafter pointed out.

In pointing out the above quantities of the several solutions with reference to a ton, this mode is adopted for convenience, but if more or less than a ton is to be operated upon, a proportional quantity of each of the solutions required is to be used accordingly.

Mode of application, &c.—One ton of raw sugar is to be mixed with the usual quantity of water; boil it in a wooden or earthen vessel, in preference to metal, and remove the impurities as far as can be effected, as usual, by scumming, blood, or white of eggs being employed in the usual manner for that purpose; then boil this, which is called liquor, and while in a boiling state, add to it the solution No. 1; bring the liquor up to boiling again, and continue this boiling a few minutes, until a peculiar and violent action in the liquid is produced, which will be immediately comprehended on trial, and then immediately throw in three pounds of pulverised chalk, and add the solution No. 2, and then stir and boil the whole for five minutes. The whole may then be filtered, evaporated for crystallization, and completed in the usual manner to produce lumps, or loaves, in moulds; but the patentees prefer, as a better mode, that the white of eggs, or bullocks' blood and animal charcoal, should be used in the usual manner before filtration, after adding, and stirring, and boiling, the solution No. 2, as before pointed out. The green sirops, as they are called, which run from moulds, are to be submitted to the foregoing process, adding to them any proportion of raw sugar; but the solution, No. 3, is in this case, to be used instead of No. 1, in the above specified quantity for every ton of the sirops and sugar so mixed, and five pounds, instead of three, of pulverised chalk are to be used; but solution No. 2 will

be required in the same quantity and manner as before stated. Green sirops, without any addition of raw sugar, may be subjected to this process, but they prefer the addition of sugar, as pointed out above. The green sirops remaining from the crystallization of green sirops, as above mentioned, may also be again subjected to the patent process, in like manner as the green sirops as before described, but beyond this they do not propose to repeat their operations.

With reference to sirop, or cane juice, from which sugar has not been separated, or made, the proportion, or quantity, of saccharine matter, or sugar, which it contains, is first to be ascertained by the saccharometer or other usual means, and then it is to be treated as raw sugar, the proportions of the solutions No. 1 and 2, and of the pulverized chalk, or carbonate of lime, having reference only to the weight of saccharine matter, or sugar, which such sirop, or juice, contains. The patentees apply their process to the working of molasses in the mode above pointed out as to green sirops.

Now, whereas the sulphate of zinc used in the solutions Nos. 1 and 3 is merely to decompose the ferrocyanate of lime; and whereas sulphuric acid has been used in the manufacture of sugar, but at a different period of the process, and for a totally different purpose than hereinbefore described; and whereas carbonate of lime has been used to neutralize the sulphuric acid when so used as last aforesaid, the patentees say they use carbonate of lime, or chalk also for the purpose of neutralizing the sulphuric acid, and for that only; therefore, they do not claim as their invention the use of chalk hereinbefore described, or any other carbonate of lime for the purpose aforesaid, neither do they claim for the use of the exact quantities before described of the solutions, nor do they claim the use of any particular compound of ferrocyanic acid, nor the particular use of the salt called sulphate of zinc, for the final removal of the ferrocyanic acid, since ferrocyanic acid in other states than in combination with lime, and other salts than sulphate of zinc, may be used, though the process described is preferred; but they claim as their invention, first, the use of ferrocyanic acid for preventing or diminishing fermentation in the process of refining sugar, and in the process of making sugar; and, secondly, the use of sulphuric acid in the making and in the refining of sugar, for promoting and increasing that effect called crystallization, and producing larger quantities of sugar. [*Lond Jour.*

Specification of the patent granted to RICHARD BUTLER, *merchant, for improvements in manufacturing obtaining, or producing oil from certain substances; and in extracting, producing, or obtaining gas from the same, or such like substances, or from oil produced therefrom. Dated January* 29, 1833.

To all to whom these presents shall come, &c. &c. Now know ye, that in compliance with the said proviso, I, the said Richard But-

ler, do hereby declare, that the nature of my said invention, and in what manner the same is to be performed, is particularly described and ascertained in, and by, the following description thereof, that is to say—

The substances from which are to be extracted oil and gas, are bituminous schistus, or shale and slate (not including slate coal,) and bituminous sandstone, which substances, when pure, do not usually cake if ignited, or thrown into a good fire; and which, by distillation, or carbonization, as hereinafter described, give an oil and gas free from naphthaline. The process for extracting the oil and gas from the said mineral substances, is this:—The said substances are to be broken into small pieces, taking care to separate therefrom any heterogeneous substance, such as clay or pirites, and put into a retort (such as used in making gas from coal,) so much of these pieces as will fill about half thereof, adding thereto some water which advances the process, but is not essentially necessary. The retort is provided with two apertures, to which are adapted pipes with cocks, so that they may be shut at will. Each of these pipes, at its other extremity, opens into a close vessel, or recipient, placed in a tub, or tank; a second pipe joins the first recipient to a second recipient, and a third pipe joins the second recipient to a third recipient, similar to the apparatus known by the name of Mr. Woolf's apparatus. Thus to each aperture of the retort, there is a distinct set of recipients, both of which sets must be made air tight. The third recipient in one of these sets, is provided with a pipe leading to a gasometer; and the third vessel in the other set, with a pipe fitted to a worm or refrigerator, which opens into a fourth vessel or recipient, from which issues another pipe, connecting at will the last mentioned or fourth recipient with the same gasometer, so that no gas may be lost. I say at will, because the gas obtained in this set of vessels is not as pure as the gas obtained through the second. Several retorts may be so arranged as to work into two main pipes, each of which will be connected by a minor pipe to one of the two apertures with which each retort is provided. By this arrangement, two sets of vessels will serve for each set of retorts; and the cocks will be placed on the main pipes, so as to shut or open these at will.

Under the retort, or set of retorts, in a common furnace, a gentle fire is to be lighted; and, after having shut the cock placed on the pipe of that apparatus, which is not connected with the worm or refrigerator, the other cock remaining open, the operation soon begins. First, a watery vapour issues from the retort; next, a yellow oily vapour, both of which are carried into the several recipients of the apparatus, where they are condensed, the most volatile of the oily particles being carried into the worm. As soon as the oily particles become of a darker colour, and are obtained from the retort, or retorts, unmixed with water, and the means by which the colour is observed, is, by having a piece of glass let into the pipe, leading from the retort; the cock belonging to this apparatus is then to be shut, and the cock belonging to the other apparatus is to be opened, at the same time the fire is to be increased, so as to bring, as soon as possible, the retort,

or retorts to a red heat. In this stage of the process oil is obtained from the retort, or retorts, with a large quantity of gas, which flows into the gasometer, whilst the oil is condensed in the several intermediate recipients.

By this method oils of different density are obtained, those obtained in the worm apparatus being more volatile than those obtained in the other apparatus. This difference should be attended to, as it is desirable not to mix them together. These oils may be designated as *Oil No.* 1, *and Oil No.* 2, the oil No. 1 being the most volatile.

Water may be used in the tanks or tubs in which the recipients are placed for more quickly condensing the products, which is the course generally pursued, although, in general, it be preferable to put some water in the retorts; this is not absolutely necessary, as before observed, but the materials may be dried, and even slightly charred, before they are thrown into the retorts; and, indeed, when the principal object is to obtain gas, they should be carefully dried before putting them into the retorts, and the retorts should immediately be brought to a red heat. In the several vessels within which the oils No. 1 and No. 2 are condensed, the oils are mixed, at the time of coming over, with ammoniacal water, and a small quantity of heterogeneous substances, particularly the oil No. 1, but they quickly separate, and the oil floats upon the surface of this water. With respect to the oil No. 2, when care is observed, it should come over free from water. The oils so produced may be said to be in their rough state, and, subsequently, the most approved methods for purifying oils, may be applied to the purification of these oils, such as working with sulphuric acid, filtration, and distillation.

These oils, in their rough state, (but it is preferable they should first undergo some degree of purification, may be manufactured into gas, by any of the methods, processes, and apparatus, by which other oils are converted into gas. The oils No. 1 and No. 2, in their rough state, are often found entirely free from oxygen; and if obtained by the process described, never contain so much as is contained in the coal tar obtained in the coal gas works, where the coal is thrown into retorts already brought to a red heat. These oils, in their rough state, are further distinguished from coal tar, by their containing no napthaline; moreover, the oil No. 2, offers another characteristic feature, if, after being drawn off and distilled, and if in this latter process, the more volatile, or first, proceeds; say one half of the quantity acted upon be set apart, and the remaining half exposed to a low temperature, there will soon appear in this part of the distilled oil No. 2, small flakes of a white, odourless, and light substance, which is a compound of carbon and hydrogen. The gas (prior to any purification) whether obtained from the oils aforesaid, or directly from the said minerals, is distinguishable from coal gas (also in its unpurified state) by its being free from napthaline. In some instances, when the said materials are found stratified in, or embedded with coal, or otherwise, and may happen to be impregnated with portions of napthaline, the bituminous schistus, or shale and slate, and bituminous sandstone, will not then be in a pure state, and, after trial, should not be used.

It will only be desirable further to add, that the gas (whether produced direct from the above mentioned materials, or from the oils obtained therefrom, as above described) may, and indeed will, in most instances, require purifying before being used, as a means of producing light; and in order to purify the same, it will be necessary, (as is the practice in gas works,) to pass it through water, and if particularly impure, then it will be desirable that such water should contain lime, as is well understood.

Having now described the invention, as communicated to me, it will be evident that the apparatus herein described, for producing the oils and gas from the materials hereinbefore mentioned, form no part of the invention, they being in themselves well known and in use, and the same may be varied without departing from the invention; for what I claim as the invention is, first, the production of oils by distillation, or carbonization, from bituminous schistus, or shale and slate (not including slate coal,) and bituminous sandstone, as above described; and, secondly, in the production of gas for illuminating purposes, from such oils, or direct from the bituminous schistus, or shale and slate, (not including slate coal,) and bituminous sandstone, as above described. [*Rep. Pat. Inv.*

Specification of the patent granted to JOSEPH PELLETIER *and* JEAN ADRIEN DESPREZ, *for improvements in making, or manufacturing, sulphate of quinine. Dated July* 25, 1833.

To all to whom these presents shall come, &c. &c. Now know ye, that in compliance with the said proviso, I, the said Joseph Pelletier, on behalf of myself, and the said Jean Adrien Desprez, do declare, that the nature of our said invention, and the manner in which the same is to be performed is as follows:—

I will first premise, that the principal object is, the production of sulphate of quinine, by means of distilled or compressed oils, whether derivable from vegetable, animal, or mineral substances, or matter as a substitute for, and without the aid of, alcohol. I will now proceed to detail the mode of producing it. Where distilled oil is intended to be used, the bark having been treated by acids, and having precipitated the quinine and the other dissoluble matters in the acid, by means of lime, in the usual method used in making quinine, the calcarious precipitate is to be dried, and reduced to a fine powder; it is then treated several times, say seven or eight, with the oil intended to be used; and from my experience I have found turpentine oil to answer the best, which is done in appropriate vases, or other fit vessels found best calculated to answer the object. The oil is then to be separated by decantation or filtration. Where expressed oil is used, care must be taken that the lime be first extracted, otherwise a soap of lime, insoluble, would be formed. The precipitate must then be dissolved in an acid, and the rough quinine be precipitated by ammonia; when in this state, it must be treated with oil several times, which will dissolve the quinine, and separate from it all matters

foreign to the same. After obtaining the quinine in dissolution, by expressed or distilled oils, the oil is to be treated by water acidulated with any acid capable of forming a soluble salt with the quinine, (I prefer Hydrochloric acid;) the acidulated water separates the quinine from the oil, the separation being easily effected by decantation, as the two liquids, having different specific weights, will not combine. The quinine thus dissolved, is to be precipitated by an alkali, and after that, it is reduced to sulphate by uniting it to sulphuric acid, care being taken to saturate and whiten by animal charcoal; it is then crystallized by the method usually adopted. There is another mode of separating the quinine when dissolved in distilled oils; this mode is by application of heat in any of the known ways used in the separation of liquids; but the process I consider less advantageous, and I therefore prefer treating the oil by acidulated water.

I claim as our invention, the production of sulphate of quinine, by the use of expressed or distilled oils, without the aid or intervention of, and as a substitute for, alcohol; and I also claim the benefits to be derived or derivable therefrom. [*Ibid.*

The Caloric Engine. By J. Ericsson.

Continued from p. 420, vol. xiii.

"The vessel by which the transfer of the heat is effected, the inventor calls the 'regenerator,' since within this vessel power may be said to be thus far regenerated, that its source, the heat, which in former engines is continually wasted, is by this apparatus preserved, or brought back to perform the same duty over again.

"By the following description it will become evident that the impelling agent or circulating medium, in the caloric engine, may consist of various æriform or fluid substances, capable of considerable dilatation by heat. But atmospheric air will probably be found the best in practice, since in case the apparatus should happen to leak, the loss caused thereby may be so easily replenished by taking any required fresh supply from the atmosphere.

"Previous to describing the action of the engine, let us suppose that the stove, with its pipes, and the working cylinder, have been heated, and likewise the regenerator with its tubes, to be brought to the same temperature nearest to the stove, gradually lessening, so as to be at the opposite end equal in temperature with the surrounding atmosphere."

"It becomes evident that if air be forced or pumped into the caps of the regenerator until it has attained any given pressure, it will, on the one hand find its way through the stove pipes, &c. into the top part of the hot cylinder, on the other hand, through the pipe, into the top part of the cold cylinder; but the hot cylinder being larger (say double the size of the cold cylinder,) it naturally follows that the power of the piston will overcome the power of the smaller piston, and make it ascend, itself at the same time descending. Thus motion will commence, and by reversing the position of the slide

valves when the pistons have performed their full strokes, the motion will be kept up without any further charging.

"The action of the engine, and the transfer of the heat, will at once be understood. The piston of the hot air cylinder being supposed in the descent, it will be seen that the hot air from the lower part of the hot cylinder escapes under the lower slide valve, through the pipe, into the body of the regenerator, and the piston in the cold being on the ascent, it draws the air from the body of the regenerator through the cooler, entering under the lower slide valve of the cold air cylinder, at the same time the air above the piston, in that cylinder, is forced through the tubes, to the stove pipes, into the top part of the hot cylinder. Thus the two cylinders are made to supply each other; but the hot air entering the body of the regenerator, will, by the peculiar arrangement of the division plates, make a very circuitous passage, and by having its particles constantly intermixed, readily give out its heat. The cold air entering the tubes, from the cold air cylinder, will also, during the passage, have its particles rapidly intermixed by the metallic discs, and thereby readily take up the heat given to the tubes by the opposite current, and accordingly become heated.

"The transfer of the heat being thus explained, it need hardly be stated that the object of the stove is, besides that of heating the apparatus at the commencement, to restore that which will unavoidably be lost by radiation, and in the transferring process. And the object of the cooler is that of abstracting any heat from the circulating medium which has not been taken up in the regenerator, that it may enter the cold cylinder at the lowest temperature possible.

"By charging the engine with air of greater density, its power will of course be increased. It is true that by increasing the density in the tubes, &c. the density in the body of the regenerator will also be proportionally increased: *still by keeping the temperature of the air that enters the hot cylinder about* 480° *higher than the air that leaves the cold cylinder, the pressure in the seven pipes will always remain nearly double that of the pressure in the body of the regenerator,** provided the motion of the slide valves be adjusted in accordance with the principle of the action of the engine. In practice, it will be found quite impossible to preserve the pressure in the engine without a constant supply from without; a pump will therefore always be attached to the engine, constantly charging the pipes of the regenerator: and to prevent overcharge, a safety valve is attached in some convenient place for carrying away the surplus.

"*By keeping the pipes in the regenerator so charged with air as to support a column of mercury* 56 *inches high, the greatest effect is produced in the trial engine. By the manner in which the slide valves are worked, the pressure in the body of the regenerator always adjusts itself, so as to support a column of mercury* 18 *inches high; so that an effective pressure, equal to* 38 *inches of mercury, is kept up. A break, well oiled and loaded, with* 5000*lbs. weight acting on the circumference of a wheel*

* By pressure is here meant the absolute pressure on a vacuum.

of two feet diameter, fixed on the fly wheel shaft, will, at the above pressure, keep the speed of the engine at 55 revolutions per minute. At this speed, 176 cubic feet of heated air, of a mean pressure of 17 lbs. to the square inch, are admitted into the working cylinder per minute, thereby exerting a force equal to 431,970 lbs. moved through the space of one foot: thus $\frac{431\,970}{33\,000} = 13$ *horses' power are communicated to the main crank of the engine. The estimating this power is, however, of no other use than to give an idea of the amount of friction to which the crank engine is subjected. In the same space of time, or a minute, 94.6 cubic feet of cold air, of a mean resistance of 14 lbs. to the square inch, are forced, or put into circulation, by the cold cylinder, and equal to a resistance of 190,575 lbs. moved through the space of one foot. This amount, divided by 33,000, will give 5.7 horses' power required to work the cold cylinder —hence the two cranks give and receive the power of upwards of 13 horses. By communicating the power of the hot cylinder to the cold cylinder, in a direct manner, the available power, setting friction aside, would be 431,970 — 190,575 = 241,395 lbs. moved through the space of one foot. This is equal to* $\frac{241\,395}{33\,000} = 7.3$ *horses' power—deducting 2.3 horses for friction would leave five horses. On these grounds the trial engine has been estimated at five horses' power.*

"The transferring process has succeeded to such an extent that out of the ten pounds of fuel which the engine consumes per hour, the product of heat from three pounds of fuel only are wasted or carried away by the cooler—this important fact has been ascertained by immersing the cooler in a cistern, containing precisely 1081lbs. of water, and by observing the elevation of temperature after an hour's work of the engine; and the increase of temperature in that time is not quite twenty degrees—one pound's weight of fuel being capable of raising the temperature of 9000 lbs. of water, it follows that the 1081 lbs. contained in the cistern would be raised 8.3 degrees by the combustion of one pound of fuel, and hence that the actual increase of twenty degrees of temperature is effected by the combustion of less than three pounds of fuel. The great discrepancy between the quantity of fuel thus wasted, and that actually consumed by the engine, must be accounted for by the fact, that a considerable extent of radiating surfaces is exposed to the cooling influence of the atmosphere without being surrounded by any imperfect conductors.

"What may be expected from an engine of a large scale, and in which the loss of heat by radiation is carefully guarded against, need not be pointed out."

We have now put our readers in possession of the whole of the pamphlet, and we have printed some of the main points in italics, to which we would more particularly wish to call their attention. If the caloric engine is to stand or fall on the correctness of the pamphlet, it will not require many degrees of foresight to predict the result. The writer states that the air being kept 480° higher in the pipes which pass through the "regenerator," than it is in the cold air cylinder, will always *remain nearly double the pressure* of the air in the body of the "regenerator;" that is, the air which has come from the *hot air cylinder*, and has only just passed through the furnace, is, in

about a second of time, become colder and of less pressure than the same quantity of air which had simultaneously been forced from the *cold air cylinder*. This, we do not hesitate to say, is erroneous; and we would advise the inventor to place a mercurial gauge in the body of the "regenerator," and he will find that we are correct. This gauge would also have another desirable effect: it would indicate the quantity of pressure which is at all times acting at the back of the piston in the hot air cylinder, which it is most material to know, for this reason, the difference of the column in the mercurial guage on the induction pipe, and the column in the guage on the body of the "regenerator," will more correctly show what quantity of expansive force is really actuating the working cylinder. Again, in respect to the 480°; if the air in the apparatus, prior to its being heated, be of equal density with the outer atmosphere, this temperature will nearly double the expansive force of the air so heated, and will raise the column of mercury in the gauge of the induction pipe to about fifty-six inches, or at a pressure of about twenty-eight pounds, on the square inch of a vacuum. This we will suppose to pass into the working or hot air cylinder, to produce the first, or up stroke, of the piston. The slides being then reversed, this quantity of air, whilst at its maximum of heat and pressure, is to be driven from the hot air cylinder into the body of the "regenerator." And here we must ask at what pressure this will be effected? The inventor says, at a pressure of eighteen inches of mercury, which he states will be the pressure existing at all times in the body of the "regenerator." This, to say the least of it, must be most erroneous. A mercurial gauge on the body of the "regenerator," would indicate a column of about thirty inches, even when the air therein was only at the density of the atmosphere. The working of the cold air cylinder would withdraw a quantity of air from the body of the "regenerator," which would be simultaneously replaced by hot air from behind the piston of the hot air cylinder. The heat and pressure of this hot air would be quickly diffused over the whole of the air remaining in the body of the "regenerator," and some of the heat would, as a matter of course, be communicated to the air passing from the cold air cylinder through the seven pipes which pass through the "regenerator" to the furnace, so long as the air passing through those pipes has less heat than that contained in the body of the "regenerator."

We never remember to have seen so many errors contained within so few lines of print—every step we take opens a fresh field for correction. The next point which strikes us with surprise, is the idea of there being a power of thirteen horses communicated to the main shaft of the engine, though the inventor does not take credit to his engine as producing this as an effective power; but after certain deductions, which we shall speak of hereafter, he tells us that the whole effective power is only equal to five horses; thus, according to his own account, losing eight horses' power by friction caused by the working of the various parts of the engine;—this calculation, like the rest, is fallacious. We will, however, bring the figures again before our readers. The inventor states that the engine makes fifty-five

strokes per minute at a mean pressure of seventeen pounds on the square inch; how this mean pressure is obtained we know not, for has not condescended to explain; these seventeen pounds on each square inch of the piston, are equal to 431,970 lbs. raised one foot high, equal to thirteen horses; the author observing, that "*the estimating this power is of no other use than to give an idea of the amount of friction to which a crank engine is subjected.*" But let us see further what is said on the power and the loss of power by this engine. The piston in the cold air cylinder also making fifty-five strokes in the minute, is said to be subject to a mean resistance, or pressure, of fourteen pounds to the square inch, between five and six horses' power to be deducted from the before mentioned thirteen horses' power; a further deduction of two horses' power is also made for friction, bringing down the effective force of the engine to *five horses.* We suspect that if four-fifths more were deducted, the engine would then not be found to perform its calculated work, for there is no mention made of the quantity of resistance at the *back of the piston in the hot air cylinder*, other than the simple observation that the air in the body of the "regenerator" will support eighteen inches of mercury, though by some magical effect the piston in the cold cylinder is said to be worked at a mean resistance of fourteen pounds on the square inch, equal to a column of about twenty-eight inches of mercury; and yet the cold air cylinder is open to the body of the "regenerator."

We will, in conclusion, sum up the principal of our objections to the propositions contained in the pamphlet, though some of our readers will probably think there are other parts equally deserving animadversion. First, the air in the body of the "regenerator" must always be capable of supporting a column of more than thirty inches of mercury, supposing the engine to commence working with air of the same density as the outer atmosphere; the author is wrong in stating it to support only eighteen inches of mercury. Secondly, the hot air, after it has actuated the piston in the hot air cylinder, will, on coming into the body of the "regenerator," impart its heat and pressure to the remaining air, and quickly equalize the pressure in all directions, a very small quantity of heat would be transmitted to the air in its passage from the cold air cylinder to the furnace. Thirdly, the air on being forced from the cold air cylinder, through the pipes to the furnace, will, as it becomes heated, react against the piston of the cold air cylinder. Fourthly, no allowance has been made for the reaction of the air behind the piston in the hot air, or working cylinder, although the air is at its maximum of heat and pressure, and has to be forced through small orifices (technically called wire drawn) into the "regenerator," which is already under considerable pressure, and which must be greater than merely sufficient to support eighteen inches of mercury, or nine pounds on the square inch, as stated in the pamphlet.

And now a few words as to the engine itself. We may be told in answer to what we have said in respect to the pamphlet, that the engine works, and has surprised many who have seen it; perhaps so,

but that does not improve the value of the engine any more than it does the value of the pamphlet. We do not hesitate to say, that the present air engine, like its predecessor, will die without issue, and that the whole power produced is the difference of pressure caused by the air passing directly from the furnace to the working cylinder: the "regenerator" being, in truth, an obstacle rather than an advantage. If, as we before mentioned, a mercurial gauge were placed on the induction pipe, and another gauge on the body of the regenerator, the difference of the columns would be very immaterial, and this, putting the friction out of the question, is the only power obtained. We have said nothing of the practical difficulties of having pipes, or tubes, acted on by fire, which would alone be sufficient, even if the principal of the engine were good, to condemn the "caloric engine;" there is also the working of the hot air cylinder and piston at a dry temperature of 500° of Fahrenheit; but these objections will be evident to every practical man, and need no further observations from us.

[*Rep. Pat. Inv.*

Manufacture of Varnishes. *By* J. Wilson Neil.

[From the Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce.]

As this paper is intended for the information and use of those persons who know little or nothing of varnish making, it has been deemed necessary to give the most ample and plain directions, which, at first sight, may appear superfluous to those who are a little acquainted with the business. But those who are the most competent judges will, I am certain, agree with me that the directions cannot be too plain, ample, or particular; either as relates to the erection of furnaces, choice of pots, and the various other implements required in the trade; and still more particularly in the choice of the various materials of which varnishes are composed; together with the more simple, easy, and economical methods of conducting and performing every operation connected with the business of varnish making.

I advise every practitioner when he commences varnish making, to keep a book, or "*working journal*," and in it to enter the day of the month and year, the quantity and quality of gum used; the quantity of oil, turpentine, and dryers; the number of hours it has boiled, the quantity of varnish produced, in gallons, the number of the cistern where it is stored, and the name which is marked on the outside. Also, and particularly, whether the atmosphere was wet, cold and dry, or very hot and dry, &c., noticing also the *day* upon which it is sent out for use. From these observations the most important information may be acquired.

Hitherto, the art of varnish making has been kept, in its details, as far as possible, a profound secret, and therefore when thrown open to investigation, and assisted by the exertions of men of real chemical research, farther improvements may, no doubt, yet be made. That

the present communication—the result of thirty years of anxious study and practical experience—may conduce to these inquiries, by stimulating the established practitioner, and urging others to the task, is the most fervent hope of the author.

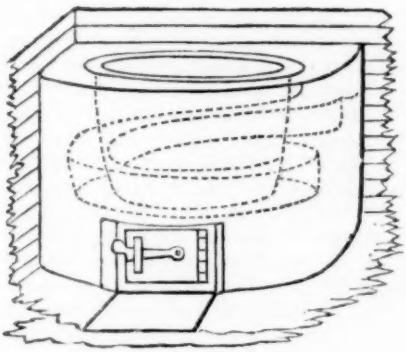
Every person intending to manufacture varnish on a profitable scale, ought to procure suitable premises some distance out of town, and sufficiently large for the scale of business intended. The building, or shed, wherein varnish is made, ought to be quite detached from any other buildings whatever, to avoid accidents by fire. For general purposes, a building about eighteen feet by sixteen, is sufficiently large for manufacturing 4000 gallons and upwards annually, if there are other convenient buildings for the purpose of holding the utensils, and warehousing the necessary stock.

On the fixtures and utensils necessary for manufacturing varnish on a scale of the above extent, I shall give the most plain and ample directions, point out the least expensive method, and afterwards leave every future operator to judge for himself of the number, size, form, and quality of the fixtures and utensils which he may require, according to his intentions and circumstances. Procure a building, or erect one, eighteen feet long by sixteen wide; the back wall eighteen feet long and eighteen high, the front eighteen feet long, and nine high, with a doorway in the centre four feet wide, with folding doors made to lift from off the hinges; let the roof slope to the front: fix also, in each end wall a frame and door four feet wide, and made to lift off the hinges also, so that, when necessary, there may be a free draft through the premises. Let three skylights be made, each four feet long by three feet broad, and fixed in the roof, not directly over the furnaces, but on one side, so as to throw light on the furnaces. Next, have three frames exactly the size of the frames of the skylights, well grooved and battened, with broad flaps to open on the outside, hung at the top with hinges, and capable of being raised by a spring lever and cord inside, as occasion may require. The skylights and flaps must be well secured by lead flushings, to prevent wet getting in, which might be attended with serious consequences.

Supposing the roof and doors all complete, in the left hand corner, against the back wall, dig out a foundation four feet by four, and two feet below the intended level of the floor; level the mould of the foundation, lay a course of brick and mortar all over, taking care that where the ash pit is to be, the bricks are good and well laid; then set out the ash pit. Mark out the circumference of the pot mouth upon the foundation, with nine inches space all round between the walls and circumference of the pot. If the pot be thirty inches diameter at the mouth, begin the ash pit, and raise it four courses of bricks high, and nine inches thick, all round the ash pit, carefully filling up and treading in a solid foundation of earth, clay, or rubbish, level with the ash pit; then lay on a piece of flat iron across the back of the ash pit, and another strong piece in front, two feet two inches from the back, for the wrought iron bars to lie on, which bars are to be one and a half inch broad at top, and two inches broad and flat

at the ends, so that when laid close there will be half an inch space between the bars. The bars to be two feet in length. The ash pit being sixteen inches wide, requires seven bars. When the bars are laid on then set the door frame and door: let the door be one foot wide, by nine inches high. Then build the fire place over the bars three courses high, with good sound Welsh or Stourbridge bricks, levelling and enlarging the fire place on each side as it rises up, leaving a flue eight inches broad by six inches high, slanting upwards to the right. Upon the third course of bricks lay another course of bricks, with their inner and upper edges cut or chipped off, so that the pot can be placed on them in the centre, where it is to be well secured by carrying up the remaining work with common bricks, forming and carrying up the circular brick work, also bringing the flue round in a spiral form, leaving it five inches wide and seven inches high, taking care not to carry the flue too high up the pot sides; for if too high it will be in danger of being overheated some time, when the pot is not near full, and thereby setting fire to the contents. The last, or finishing course of bricks, ought to be laid in composition, with the inner ends under the flanch of the pot mouth, and with the outer ends a little raised upwards. This pot being complete, call it the set pot; (fig. 1;) it is used for the purposes of boiling oil, gold size, japan, and Brunswick black, &c.

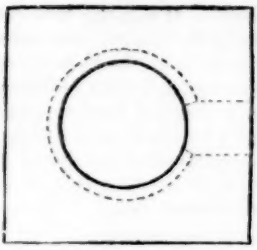
Fig. 1.



Boiling Furnace.

Dig out a foundation facing the front door, against the back wall, four feet by four, and two feet deep; lay one course of brick and mortar, as before; build up an ash pit exactly as before, only leave a distance of one foot between the back end of the ash pit and the wall. When the pit is raised four bricks high, lay on seven bars as before, placing the frame and door in front; then build a circular fireplace of twenty-one inches in diameter, four bricks high, formed with the

Fig. 2.

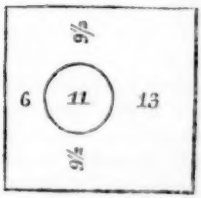


halves, or square ends of Welsh or Stourbridge bricks, well laid and close set: float the surface of the top course well, and have ready the cast iron plate, (see fig. 2,) dimensions thirty-five inches by thirty-five, one inch thick, with a circular hole seventeen inches diameter in the centre of the plate. A flue is to be left at the back of the brick work eight inches wide by six inches high, into the chimney shaft. Finish the ash pit outside the furnace door, with a grating to fit, it then will be complete.

Gum Furnace.

Against the back wall, in the right hand corner, dig out a foundation of three feet by three, and two feet deep; lay a course of brick and mortar; mark out and erect an ash pit, the back of which is to be sixteen inches from the back wall, and nine inches from the end wall. The ash pit is to be sixteen inches in width by twenty-eight in length; raise it five bricks high, carrying up the other part of the brickwork at the same time, thirty inches long by thirty-seven inches in breadth in front; then level all round, and tread in solid; lay a piece of flat iron at the back, and two pieces in front, to receive and rest the bars upon, (seven in number,) the same thickness as the others, only thirteen inches extreme length, including one and a half at each end, made flat to the breadth of two inches: nine inches clear of the brick work lay the bars, and raise a circular fireplace nine inches diameter inside, without any door, or frame, in front, only leaving the ash pit open. Carry up four inch brick work between the fireplace and the front, with Welsh or Stourbridge brick ends, set in loam, round the fireplace; they must be laid close and solid, the outer ends of them well wedged. Above the third course leave a flue at the back eight inches wide and six inches high, to communicate with the chimney shaft. On the third course, above the bars, lay two more courses of brick, rather bevelling, or widening, the furnace at the top.

Fig. 3.

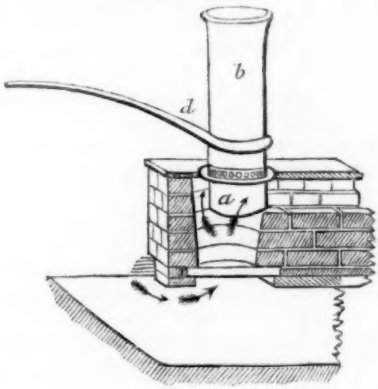


Have ready a plate cast on purpose, three quarters of an inch thick, thirty inches long from back to front, and thirty inches wide, with a circular hole of eleven inches diameter, not in the the centre of the plate, but only six inches from the front end, (see fig. 3.) Finish the perpendicular brick work square with the edges of the plate, lay a movable grating over the ash pit in front, and it is complete. All furnaces require to have slow fires kept in them for a day, in order to dry them slowly, and prevent their cracking.

Gum Pot.

Procure a copper gum pot to fit into the last furnace, No. 3; the dimensions are, two feet nine inches high from bottom to top, nine and a half inches diameter across the bottom, outside. The bottom is hammered out of a solid block of copper, and fashioned all of one piece, exactly like a hat without the brim (see *a*, fig. 4.) The upper part of the pot *b* is made of sheet copper, of a cylindrical form, ten inches diameter at top, and two feet two inches high, about three-eighths of an inch thick; the lower part of the cylinder is then riveted to the bottom with copper rivets, the heads of which are inside, and project through the lappings of the copper, flattened on both sides. Previous to riveting on the bottom, a flanch of copper, of about three-eighths of an inch in thickness, is fixed on to the bottom part, under the large rivets: it is fixed horizontally round the pot. Also, previous to riveting on the bottom, put on the iron hoop *d*, one and a half inches in breadth, to which is welded an iron handle, made one inch broad by one inch thick, gradually increasing to two inches in breadth, but decreasing in thickness. The length from pot to handle end, two feet eight inches.

Fig. 4.

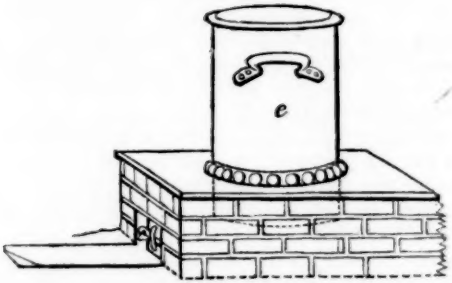


Boiling Pot.

Procure a copper pot *e*, to fit furnace fig. 5, the bottom to be beat out of the solid, as the gum pot, and of the following dimensions:—Diameter across the bottom, outside, twenty inches; height of bottom seven inches; the cylindrical or body part of the pot to be two feet ten inches in depth, and joined to the bottom part with strong copper rivets, made to project through at least three-quarters of an inch, and to be well hammered, inside and out; for, as there is no flanch, the rivets must be large and strong to support the weight of the pot and its contents, while boiling on the furnace place. It ought to fit the

plate neatly, yet so easy as to lift off freely. Seven inches below the mouth of the pot fix on two strong iron handles, one on each side, riveted through each end with two strong rivets; the space for the hands to be seven inches, and one and a half inches in diameter, and to project four inches from the pot sides.

Fig. 5.



Copper Ladles.

Two copper ladles, made to hold two quarts each, with the bowl part beat out of the solid copper, and riveted to a rod of the same metal, three and a half feet long, and three-quarters of an inch diameter, and finished with a turned hardwood handle, seven inches long, and riveted at the end.

Fig. 6.

Two good ladles for the iron set pot, made of sheet copper or sheet iron (cast iron being too heavy,) with good ash handles. For a pot of forty gallons, or upwards, the ladle to hold three quarts. Handle five feet long, tapering towards the hand.

Two copper stirrers, (fig. 6,) made from three-quarter diameter copper rods, three and a half feet long, beat flat at the one end to one and a half inch in breadth, eight inches up the rod; to be finished with ferruled hands, seven inches in length.

One large, strong, well made copper funnel, with lapped seams, for straining boiling varnish, or oil, (tin, or soldered ones, would melt.)

One copper oil-jack, (fig. 7,) which will contain two gallons, for pouring in hot or boiling oil, with a large, strong, pitcher-fashioned handle, and a spout in front.

Fig. 7.

One brass, or copper sieve, containing sixty meshes to the inch, nine inches diameter, for straining the first varnish.

One brass sieve, containing forty meshes to the inch nine inches diameter, for straining gold size, turpentine, varnish, boiled oil, &c.

One brass sieve, forty meshes to the inch, and nine inches diameter, for straining japan and Brunswick black.

One saddle (fig. 8,) which is a sheet of plate iron, or tin, twelve inches broad, and turned up one and a fourth inch at each side: it is to lie from the edge of No. 1 pot, on the edge of the tunnel, to prevent the spilling of the varnish during the time of taking it out.

Fig. 8.

One tin pouring pot, to hold three gallons, made exactly like a garden watering pot, only smaller at the spout, and without any rose: this is never to be used for any purpose except pouring oil of turpentine into the varnish.

One three gallon tin jack, made with a strong handle at back, and a large broad spout in front: used for receiving the washings, when poured out from the gum pot.

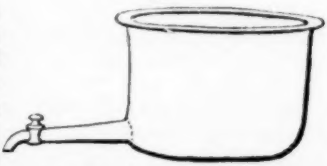
A small broom, termed a swish, made from the waste cuttings of cane tied on a small handle, like a hearth broom, the head five inches long, and five inches round, with handle three feet long: its use is for washing out the gum pot each time it is used; to be always kept clean and left in oil of turpentine.

One iron trevet made with a circular top fourteen inches diameter, with four small cross bars; the three feet of the trevet twelve inches high: it is used for setting the gum pot upon, with its bottom upwards, for a minute between each running.

Directions for Clarifying Oil for Varnish.

Procure a copper pan, (fig. 9,) made like a common washing copper, which will contain from fifty to eighty gallons, as occasion may require; when wanted, set it upon the boiling furnace, fig. 5, and fill it up with linseed oil within five inches of the brim. Kindle a fire in the furnace underneath, and manage the fire so that the oil shall gradually, but slowly, increase in heat for the first two hours; then increase the heat to a gentle simmer, and if there is any scum on the surface, skim it off with a copper ladle, and put the skimmings away. Let the oil boil gentle for three hours longer, then introduce, by a little at a time, one quarter of an ounce of the best calcined magnesia for every gallon of oil, occasionally stirring the oil from the bottom. When the magnesia is all in, let the oil boil rather smartly for one hour; it will then be sufficient. Lay a cover over the oil to keep out the dust while the fire is drawn and extinguished by water; then uncover the oil, and leave it till next morning; and then, while it is yet hot, lade it into the carrying jack, or let it out through the pipe and cock: carry it away, and deposit it in either a tin or a leaden cistern, for wooden vessels will not hold it; let it remain to settle for at least three months. The magnesia will absorb all the acid and mucilage from the oil, and fall to the bottom of the cistern, leaving the oil clear, transparent, and fit for use. Re-

Fig. 9.



collect, when the oil is taken out, not to disturb the bottoms, which are only fit for black paint.

[TO BE CONTINUED.]

Machine for Silvering Looking Glasses. *By Mr.* GEORGE FARROW.

[From the same.]

The common silvering table for looking glasses is a slab of stone, ground to the most perfect degree of evenness, and placed in a frame so that a certain degree of obliquity can be given to it. All round the margin is a gutter, through which, at one corner, a hole is made, so as to allow the escape of the mercury when the plug that closes the hole is removed. It is this corner which is lowest when the oblique position is given to the table, in order that the mercury may run to it from the other parts of the gutter. On the silvering table is spread a sheet of tin foil of the same size as the glass, or rather a little larger, a fluid amalgam of tin is then poured on it, and spread over its surface with a brush till it adheres; more mercury is then poured on, till it stands about a quarter of an inch deep over the tin foil. The plate of glass, being previously made quite clean, is then slid gently and steadily from a sheet of paper, just dipping below the surface of the mercury, but avoiding to touch the tin foil, for fear of tearing it. When the glass is fairly over the tin-foil, the table is placed a little oblique by means of a rack; the mercury now runs into the gutter, and the glass subsides on the tin-foil. The whole surface of the glass is then covered with leaden seven-pound weights, having cloth at the bottom; by this pressure, at the end of twenty-four hours, the silvering is so firmly adherent to the glass, that the weights may be removed, and the glass raised up in a sloping position, to allow the mercury to drip off, till the silvering has become quite hard.

Mr. Farrow's improvement consists in dispensing with the loose leaden weights, and in producing the required pressure by means of screws. It is attended with the following advantages. First, all hazard of breaking the glass during the application of the pressure is avoided; when loose weights are used, one will sometimes slip out of the hand of the workman and falling on the glass, will break it. Secondly, the plate, as soon as the pressure is made by means of the screws, can be tilted up, even in a vertical position, so as to expedite considerably the drip of the mercury from the silvering—an operation which is manifestly impossible where loose weights are employed.

Mr. Farrow himself has hitherto applied his invention only to small plates for dressing table glasses; but Mr. Wheeler, a manufacturer of looking glass, has applied Mr. Farrow's apparatus, with some modifications, to plates forty-seven inches long, and twenty-nine inches wide.

In the accompanying figures, 1 is a top view of one end of a large stone bed, 2 is a section of the same; *a b*, the stone slab; *c d*, its frame, containing the usual channel for the mercury; *e*, one of the end supports, on which the bed can turn, for the purpose of being tilted;

the middle strengthening bar *f*, which serves for an axis, is placed a very little on one side, to make the side *d*, at which the slope is given, always preponderate, that side usually resting on one or more screws,

Fig. 1.

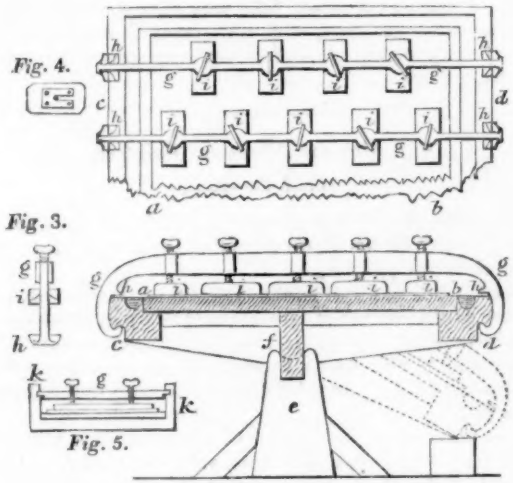


Fig. 2.

by which it is lowered or raised again. The dotted lines in fig. 2 show that side of the bed as lowered, and resting on a block. The upper and under sides of the frame *c d* are made quite parallel, to fit the hooked ends of the long clamps *g g*, which slide from one end to the other. The clamps are furnished with little plates *h h;* these project inwards, for the clamps to stand and slide on when the screws are loosened. They are also, with the under hooks, made sufficiently wide, as shown in the end view fig. 3, to prevent the clamps from falling on one side. A sufficient number of these clamps is provided to range over the bed about one foot apart; and the screw holes in one clamp are made to be opposite the intervals in the next, as shown in fig. 1, in order to distribute the pressure more equally over the surface of the glass. *i i i*, the clamping blocks of wood, faced with leather; they hang on the screws loosely, so as to rise and fall with them, and allow of being placed in any position. Fig. 4, one of these blocks separate; they are about seven inches long, and the screws are eight inches apart. The clamps are usually all drawn to one end of the bed, to be out of the way, and to make room for the glass plates being slid on, and need only be taken off when the largest glass is to be silvered, and then replaced to give the pressure.

Fig. 5 is an end view, or elevation, of a portable bed for silvering small glasses, and is Mr. Farrow's original invention; it has wooden

sides, *k k*, raised above the bed, in which the several wooden clamping bars, *g*, slide. Here two screws only are used to each bar; and the battens that hang on their lower ends are in one piece. This, with the glass on it, is placed by hand in any required position.

The glasses being quite clean for silvering, the faces of the battens, or clamping blocks, *i i i*, never take any dirt whilst in use; and as they always remain pendent, with their faces downwards, when out of use, they keep clean, so that the glasses are not liable to any scratches from them.

¶ *Vehicle for Miniature Painters.*

[From the same.]

The Silver Isis Medal was presented to Mr. J. Hammond Jones, Miniature Painter, for his Fluid intended to be used as a vehicle for colours in miniature painting.

Ivory used to be, and still is, the material on which most miniature paintings are executed; but of late, slabs of fine porcelain biscuit ware have been introduced in its place, as being easier to obtain of large dimensions, and as affording a firmer hold for the colours than ivory does, on account of the great difficulty of freeing that substance entirely from oil.

The pigments used by the painter of miniatures are mixed up with gum water; but as gum is a substance very soluble in water, there is a considerable difficulty in laying a tint cleanly and evenly over another, from the liability of the gum contained in the first tint to soften on the application of the second, and thus produce a muddy colour intermediate between the two. If the artist, also, happens to be short sighted, he is obliged to bring his face very near his work, and then the moisture of the breath will scarcely allow the tints that are mixed up with gum water to dry.

The liquid vehicle that Mr. Jones employs for his colours is a cold saturated solution of borax in distilled water, in every quart of which is afterwards dissolved a quarter of an ounce of gum tragacanth.

The ivory or porcelain plate is first to be covered with two or three layers of the liquor, allowing sufficient time for one layer to dry before the next is added; and then the colours are laid on, each being mixed to a proper consistence with a few drops of the liquid.

The above mentioned vehicle renders whatever colour it may be united with so hard and firm, when dry, that tints may be laid or washed over each other with the same ease as tints of water colours on paper; and thus the artist is enabled to work in his draperies and back grounds with more boldness, facility, and expedition.

¶ *New Apportionment of the Globe for representation in Maps.*

Sir,—It has long ago been remarked by me, what little variety was to be found in atlasses, with regard to the representation of large

portions of the sphere. A pair of hemispheres on the plane of a meridian (20° W. long.,) and a map according to Mercator's development, constitute in general the whole, though sometimes a pair of equatorial hemispheres is added. The projections are either stereographic, or globular:* in modern times the latter, without any good reason, has prevailed. In fact, the globular meridianal projection is become so common, that its faults are softened down by familiarity, and it is only when we view the equatorial delineation upon the same principles that the great distortion near the borders is perceived; and yet the only difference between the two cases is, that the distortions are in contrary directions.

Lately, the Society for the Diffusion of Useful Knowledge published maps of the Celestial Sphere, referred to the six sides of a cube, by what is called the Gnomonic projection; and, more recently, a similar set for the terrestrial globe. The former are liable to many objections, but the latter are excessively awkward and inconvenient. Europe, Asia, and North America are cut asunder in the midst, and there being no overlapping portions, the connexion of those parts which we wish to view in entirety is wholly interrupted.

The contemplation of these last mentioned maps, induced me to consider whether some better method could not be divised, of representing the whole world in convenient sections, and at the same time avoiding the too great distortion or expansion of scale which occurs in hemispheres. And it appeared to me, that the globe might be projected in four equal portions, on the faces of an equilateral pyramid. This, however, would produce nothing but triangular maps, which would look badly enough; the next step, therefore, was, to extend the limits of each plane of projection to a circle circumscribing the triangle, whereby each map would represent a *third* instead of a fourth of the spherical surface, and an overlapping of the several portions, to a moderate extent, would take place, and be highly advantageous.†

Having pursued this idea into all its details, with reference both to terrestrial and celestial maps, the result is so satisfactory to my mind, as to induce me to submit it to the consideration of the public.

I propose to make the *North Pole* correspond to the apex of the pyramid; of course the *South* will touch the base of the solid at its centre. The middle latitude (or declination,) of each of the other three planes will be $19\frac{1}{2}°$ N.;‡ and the pole being at the upper point of the circumference, the greatest south latitude will be 51° nearly. The longitude of these centres will of course differ by 120°, but their

* It should be rather called *pseudo*-globular. For the *equal* division of the central meridian, and the longitudinal and latitudinal *circular* arcs, do not constitute a true projection. A point of view may indeed be taken, which will make the divisions of the radius *nearly* equal, but then the meridians and parallels become all *elliptical*. The stereographic projection does not, strictly speaking, distort the superficial representation: an expansion of scale takes place, which is equal in every direction; but in the globular there is a real distortion.

† The overlapping portions will be six, each equal to one-eighteenth of the sphere, and of a lenticular form.

‡ More accurately 19° 28′ 16″.

relation to the first meridian is arbitrary. The projection will be the stereographic, the principal objection to which, as applied to hemispheres, will disappear, since the radius of each circle will be $70\frac{7}{8}°$, instead of 90°, and the variation of scale be only from one to one and a half, instead of from one to two.*

All that I have stated thus far concerns equally celestial and terrestrial maps.

For the terrestrial, I propose the three central longitudes to be 60° E., 60° W., and 180° from the meridian of Greenwich. From these data results the following distribution of the continents:—

Section 1, comprises all Europe, Africa and Asia (except part of Siberia, east of Ocholsk.) It includes the Indian islands as far as Gilolo, and also embraces Iceland and the east coast of Greenland, beyond 69° N.

Section 2 comprises the whole of America, (except the Russian settlements;) also western Africa and Europe. It furnishes a representation of the North Atlantic Ocean, very superior to any commonly found in atlasses.

Section 3 comprises the North Pacific ocean, and so much of the south as comes within the modern description of Polynesia, with New Zealand, New Holland, and the Indian Archipelago (except Sumatra and Java.) The western part of North America, and the eastern part of the Asiatic continent, are also within its confines.

Section 4. The southern circumpolar map, containing scarcely any thing but an expanse of ocean. The portions of Africa, South America, and Australia, which fall within it are almost entirely included in the overlapping portions of the other sections, so that this map might easily be dispensed with.

For celestial maps, with a view to compromise as much as possible entire constellations, I place the three central points in RA. 90°, 210°, 330°, whereby we have the following arrangement, naming each section after the constellation in which the centre falls:—

1. Section of Orion. Camelopardalus, *Lynx*, *Auriga*, *Perseus*, Triangulum, Aries, Taurus, Gemini, Cancer, *Eridanus*, Orion, Minoceros, Canis Minor, *Hydræ corpus*, Lepus, Columba, Canis Major.

2. Section of Bootes. Ursa Minor, Draco, Ursa Major, Leo Minor, Canis Venatici, Coma Berenicis, *Bootes*, Corona Borealis, Hercules, Serpens, Serpentarius, Leo, Virgo, *Libra*, Scorpio, Saxtans, Crater, Corvus, Hydræ cauda.

3. Section of Pegasus. Cepheus, Casciopea, Lyra, *Cygnus*, *Lacerta*, *Andromeda*, Pegasus, Vulpecula, Sagitta, Delphinus, Aquila et Antinous, Equuleus, Scutum Sobieski, Sagittarius, *Capricornus*, Aquarius, Pisces, Piscis Australis, Cetus.†

4. Southern circumpolar Section. This includes only stars which either do not rise at all to Great Britain, or whose meridianal altitude is under 20°. In fact, the whole that come under the latter description are comprehended in the overlapping portions of the

* The scales at any two points of a stereographic map are in the ratio of the square semi-secants of the respective distances from the centre.

† The constellations in italics are *divided* in the Society's maps.

other three sections, except three small and very unimportant triangular spaces.

The kind of celestial maps here described correspond substantially with those I have recommended for students in your volume xviii. p. 81; but I did not at that time contemplate giving them a circular form, or placing the centre of projection out of the equator. Both these changes I consider improvements.

I should like much to see published a set of maps both celestial and terrestrial, upon the same scale as those published by the Diffusion Society. The clear diameter of each map would be 14.14 inches (equal to the diagonal of the square maps,) and I think they would answer best if each set were engraved on a single plate.

I subjoin a table of the central distances and radii of curvature for the meridians and parallels of the map, whereby the delineation is rendered as easy as that of a common hemisphere—observing that the centres of the meridianal arcs are in a line at right angles to the principal meridians—and distant 3.536 from the centre of the projection. I have given, also the computed half extents of longitude on the several parallels of latitude. If the limits be delineated, according to the last mentioned numbers, on a Mercator's map, they will present a curve resembling a parabola, having for a symptotes two meridians 180° distant.

PARALLELS.						MERIDIANS.		
Lat.	Dist.	Radii.	S. 15	3.10	129.76		Dist.	Radii.
			20	3.59				
90	7.07		25	4.09	101.42	90	10.61	10.61
85	6.44	0.66	30	4.60	51.94	85	9.72	10.65
80	5.84	1.32	35	5.15	34.09	80	8.90	10.77
75	5.26	1.99	40	5.71	24.75	75	8.14	10.98
70	4.72	2.69	45	6.30	18.91	70	7.43	11.29
65	4.20	3.41	50	6.93	14.85	65	6.76	11.70
60	3.69	4.17				60	6.12	12.25
55	3.20	4.98	Lat.	Extent.	Long.	55	5.52	12.95
50	2.73	5.85				50	4.95	13.85
45	2.27	6.80	70	86°	26′	45	4.39	15.00
40	1.81	7.85	60	84	54	40	3.86	16.50
35	1.36	9.03	50	82	36	35	3.34	18.49
30	0.92	10.39	40	80	31	30	2.84	21.21
25	0.48	11.99	30	78	13	25	2.35	25.10
20	0.05	13.92	20	75	40	20	1.87	31.01
			N. 10	72	44	15	1.40	40.98
15	0.39	16.31	Equat.	69	18	10	0.93	61.08
10	0.83	19.42	S. 10	65	5	5	0.46	121.70
N. 5	1.27	23.19	20	59	40	0	0.00	infin.
Equat.	1.71	30.00	30	52	14			
S. 5	2.17	40.48	40	40	42			
10	2.63	61.70	50	13	45			

Lewes, Nov. 21, 1833. J. W. WOOLLGAR.

CANALS IN THE STATE OF NEW YORK.

STATE CANALS.

Canal Eras.

Erie Canal, commenced July 4th, 1817.
First navigated from Utica to Rome, fifteen miles, October 23, 1819.
Tolls first received July 1, 1820.
280 miles of canal completed, and first boat entered the Hudson at Albany, from the north and west through the canal, October 8, 1823.
Erie Canal completed October, 1825.
Champlain Canal commenced October, 1817; navigable November 1819.
Grand Canal Celebration at New York city, November 4, 1825.
Oswego Canal commenced, 1826. Completed 1828.
Cayuga and Seneca Canal commenced 1827. Completed, 1829.
Chemung Canal commenced 1830. Completed 1833.
Crooked Lake Canal commenced 1830. Completed 1833.

Description of the Canals.

ERIE CANAL.

Length from Lake Erie to the Hudson River, 363 miles, viz.—

Western section—Buffalo to Montezuma, on Seneca River,	157	21 locks; fall	186 ft.
Middle do.—Montezuma to Utica,	96	11 rise & fall	95
Eastern do.—Utica to Albany,	110	52 fall	417
Total . .	363	84 rise & fall	698

Lake Erie is 565 feet above the Hudson river at Albany.
The canal is 40 feet wide on the surface, and four feet deep.

CHAMPLAIN CANAL.

This canal commences at the junction with the Erie canal, nine miles north of Albany, and terminates at Whitehall, in the county of Washington, connecting the waters of the Erie canal and the Hudson river with Lake Champlain. It has a lateral cut connecting it with the Hudson River by three locks at Waterford, eleven miles north of Albany, as the Erie Canal has connecting it with the same river at West Troy, by two locks.

Length from Lake Champlain, at Whitehall, to junction with Erie Canal, nine miles above Albany, sixty-three miles. Number of locks, as follows:—

7	locks rise from the lake to the summit level,	54 feet.
14	do. fall from the summit level to the Hudson,	134
Total, 21 locks.		Rise and fall, 188

OSWEGO CANAL.

Length from Salina to Oswego, thirty-eight miles; connecting Lake Ontario with the Erie Canal. One half the distance is canal, and one half slack water, or river navigation, with a towing path on the bank. Fourteen locks, (thirteen of stone, and one of wood and stone.) Descent from Salina to Lake Ontario, 123 feet.

CAYUGA AND SENECA CANAL.

Commences at the Erie Canal at Montezuma, Cayuga county, and terminates at Geneva, Ontario county, connecting the waters of the Erie Canal with those of Seneca Lake. This canal has also a lateral branch to East Cayuga village, on the Cayuga Lake, thus connecting with the waters of that lake. It opens a lake navigation of more than 100 miles.

Length twenty miles and forty-four chains, from Geneva, on the Seneca Lake, to Montezuma on the Erie Canal. One half canal, and one half slack water navigation. 2,710 feet of tow-path bridges. Eleven wood locks. Descent 73½ feet from Seneca Lake to the Erie Canal at Montezuma.

CHEMUNG CANAL.

Extends from the head waters of the Seneca Lake to the Chemung (or Uioga) River, a branch of the Susquehannah, at the village of Elmira, Tioga county. Length 22¼ miles, with a navigable feeder from Painted Post, Stuben county, on the Chemung River, to the summit level, 13½ miles, making thirty-six miles of canal navigation. This canal thus forms part of a chain of communication from the Erie Canal to the Susquehannah River. It has fifty-two wood locks, comprising 516 feet of lockage, and one guard lock, three aqueducts, five culverts, and seventy-six bridges. Distance from Elmira to Albany, via. this canal, Seneca Lake, Cayuga and Seneca and Erie Canals, 326 miles.

CROOKED LAKE CANAL.

Extends from Penn Yan to Dresden, both in Yates county, connecting the waters of the Crooked and Seneca Lakes, through a beautiful and fertile country. It is eight miles in length, and has 260 feet of lockage, which is overcome by twenty-seven wood locks. The other structures are one guard lock, twelve bridges, three culverts, and one waste wier.

CHENANGO CANAL.

An act of the legislature was passed, February, 1833, authorising the construction of the Chenango Canal, to extend from the Erie Canal in Oneida county, to the Susquehannah River at Binghamton, Broome county. Length about ninety-five miles. Route as follows: Commencing at Whitesborough, or Utica, passing through the valleys of the Oriskany and Sawquoit Creeks, and Chenango River, and by the towns and villages of New Hartford, Clinton, Madison, Hamilton, Sherburne, Norwich, Oxford, Greene, and Chenango Forkes, and ter-

minating at Binghamton, where it unites with the Susquehannah River

Elevation from the Erie Canal to the summit level, 706 feet.
Descent from thence to the Susquehannah River, 303

Total lockage, . . 1,000

The estimated cost of this canal by Mr. Hutchinson, Civil Engineer, in 1828, was $944,775 36; but the Canal Commissioners, in their report of January, 1834, estimate the cost at $1,737,703 22.

During the season of 1833, surveys of different routes were made from Sherburne, a few miles south of the summit level, north to the Erie Canal, and a preference given to the route terminating at Whitesborough. (The legislature, at their present session, have decided to change it to Utica.) On this part of the canal there will be eighty-seven locks and four aqueducts; and it is proposed to construct the locks with wooden chambers, supported by a dry wall of stone masonry on the sides, excepting about eight feet below the upper gates. Some of the locks are to be of stone. The plan adopted for making this canal, and its different structures, will increase its aggregate cost beyond the sum for which a canal less substantial might have been constructed; but it is the opinion of the Canal Commissioners that it will prove the cheapest and most useful, requiring less expense for repairs. To supply the summit level with water, artificial reservoirs are to be constructed, and fed from ponds and brooks.

Contracts for the thirty-eight miles between the Erie Canal and the village of Sherburne (excepting the reservoirs and feeders,) have been made, and the 15th of October, 1836, is the time stipulated for the completion of the work. Surveys have been made from Sherburne to Greene, Chenango county, and the present season the surveys from Greene to Binghamton will be completed. These sections will be placed under contract as soon as convenient after the completion of the surveys and estimates.

One million of dollars have been appropriated to the construction of this canal, and an additional million is recommended by the Commissioners in anticipation of contracts.

Summary of Canals Completed.

	Length.	Cost.	Tolls, 1833.
Erie Canal	363 miles	9,027,456 05	1,290,136 20
Champlain do.	63 do.	1,179,871 75	132,559 02
Oswego do.	38 do.	565,437 35	22,950 47
Cayuga and Seneca do.	20 do.	236,804 74	17,174 69
Chemung do. and feeder	36 do.	342,133 95	694 00
Crooked Lake Canal	8 do.	136,331 95	200 84
Navigable feeders on Erie, Champlain, and Cayuga, and Seneca Canals.	11 do.	$11,488,035 99	1,463,715 22
Total, and owned by the State.	539 miles of canal navigation, completed Average cost per mile $21,314.		

CONTEMPLATED CANALS.

Genesee and Allegheny Canal.

Public attention has been frequently called to the subject of a canal proposed to be made from Rochester on the Erie canal, to Olean (or Hamilton) on the Allegheny River; and a bill has been introduced into the legislature directing a particular survey of the route, and estimate of the cost of construction. The route was superficially surveyed in 1825, by an engineer of the State, and in 1826 a report made to the legislature by the Canal Commissioners. The canal is to commence at Rochester, following the valley of the Genesee River, through Monroe, Livingston, and Allegheny counties, until it reaches the Upper Genesee Falls, at Nunda, in the latter county, from whence it rises to the summit level 981 feet above the Erie Canal. The length of the summit will be eight miles, and the whole fall, from thence to Olean, Cattaraugus county, on the Allegheny River, is seventy-eight feet. Whole lockage, ascending and descending, 1,059 feet. The length of canal from Rochester to Olean, will vary little from 100 miles. The lockage is equal to 132 eight feet locks on the whole line; being about the same proportion of lockage as the Chenango Canal. A passage from the Ohio valley to the Genesee valley is here 1488 feet above tide level, and is less elevated than any passage that has been examined, either to the Potomac or the Susquehannah valleys. With regard to a supply of water for the summit level, it is remarked by the engineer that the whole of the Ischua Creek can be received into a summit pond; besides, the drainage of 190 miles of surface can be turned into it, so that the reservoir would be abundantly supplied with water. Mr. Roberts, engineer, gives the following account of the capacity of the streams in October, 1825.

Ischua Creek, cubic feet per minute, . .	750
Lime Lake, Beaver Lake, and Peacock Lake, . .	400
Oil Creek, ...	450
Together, per minute,	1,600

In the report referred to, the estimated cost of the proposed canal is 875,588 dollars.

The distance of Rochester from Albany by the Erie Canal, is 270 miles; from thence to Olean, by the proposed canal, say ninety miles; from Olean to Pittsburgh, by the Allegheny River, (which has been navigated by steam-boats,) 260 miles.

"A canal, (says Mr. Roberts,) uniting with the Allegheny River, would accommodate a large section of our country, whose surplus products are equal in quantity and quality to those of any portion of the state, in proportion to its cultivated land and population, in both which respects it is rapidly increasing. Other considerations are, the great enhancement in the value of lands, which are known to abound in lumber of the best quality, and coal mines, and other minerals, on the various branches of the Allegheny, and the very extensive commerce which would be drawn through this canal, and down the

Allegheny and Ohio, and from the countries adjacent. With all these advantages, the canal would undoubtedly soon become a source of increasing revenue to this state."

The following statement of tolls collected on the western part of the Erie Canal, being ninety-three miles, or about the same length as the proposed canal, will form some data to calculate the probable income of the latter. If the proposed improvement should cost 1,000,000 dollars, the interest thereon. at five per cent. would be but 50,000 dollars.

Statement of Tolls collected on the Erie Canal at Rochester, and other places west of the Genesee River, in 1832 *and* 1833.

	1832.	1833.
Rochester	154,541 08	168,452 37
Brockport	13,025 81	18,554 55
Albion	10,219 43	15,178 84
Lockport	28,434 22	50,562 89
Buffalo	58,232 09	03,812 79
	$264,452 63	$326,560 94

A meeting of citizens in the State of New York, favourable to the Genesee and Allegheny Canal, was held in October, 1833, at the Shakspeare Hotel, Christian Bergh, Chairman, Edwin Williams, Secretary; when resolutions were adopted expressive of the opinion of the meeting as to the importance of the proposed canal. A committee of forty-five gentlemen was appointed to call the attention of the citizens generally to the subject. Under the direction of the committee, an interesting pamphlet was prepared and printed, entitled "An appeal to the people of the State of New York, and their representatives in the legislature, in favour of constructing the Genesee and Allegheny Canal.

Black River Canal.

The Canal Commissioners report, March, 1831, that the cost of the proposed canal from Rome to the High Falls of the Black River, a distance of thirty-six miles, and including a navigable feeder of nine miles, at Boonville, with the improvement of forty miles of the river navigation from the High Falls to Carthage, is estimated at 602,544 dollars.

The whole rise and fall from Rome to the Black River, is . . . 1,078 feet.

Length of canal and river navigation, . 76 miles.

The supply of water is to be obtained from the Black River, which, at Smith's mills, is estimated to afford 20,000 cubic feet per minute, in ordinary dry seasons. (See Incorporated Canal Companies.)

[*N. Y. Annual Reg. for* 1834.

CELESTIAL PHENOMENA, FOR AUGUST, 1834.

Calculated by S. C. Walker.

Day.	H'r.	Min.	Sec.								
8	16			♀	☌	β	Virginis	♀	2′	North.	
11	13	13		♂	☌	♊		♂	7′	North.	
18	8			♄	☌	γ′	Virginis	♄	34′	South.	
22	6	10		☿	Greatest elongation W.						
27	6	49		♊	☌	☽	♊		23′	North.	
27	22	57		♂	☌	☽	♂		3′	North.	
31	10		15.1	♀	☌	a	Virginis	♀	1°.4′	North.	
2	12	30	01.0	Im.	♃'s	3	Sat.				
2	14	42	25.8	Em.	”	3	”				
4	13	21	56.1	Im.	”	2	”				
4	15	38	14.4	Em.	”	2	”				
4	16	36	39.0	Im.	”	1	”				
6	11	4	42.3	Im.	”	1	”				
9	16	29	28.3	Im.	”	3	”				
11	15	58	12.6	Im.	”	2	”				
13	12	58	43.4	Im.	”	1	”				
20	14	51	11.9	Im.	”	1	”				
27	16	45	41.7	Im.	”	1	”				
29	10	31	32.9	Im.	”	2	”				
29	11	13	40.4	Im.	”	1	”				
29	12	49		Em.	”	2	”				
1	14	9		Im.	11		Geminorum	,7,	N168°	V112°	
1	14	31		Em.					216°	168°	
11	10	51		Im.	32	ζ′	Libræ	,6,	104°	151°	
11	11	44		Em.					226°	277°	
12	8	13		Im.	(39)		Scorpii	,7,	133°	160°	
12	8	53		Em.					197°	226°	
17	10	27		Im.	25	χ′	Capricorni	,5,6,	90°	80°	
17	11	49		Em.					310°	319°	
17	15	54		N. App.	☽	and 28	♑	Capricorni	,6,	☽	N0.′3
19	11	27		Im.	71	π^2	Aquarii	,5,6,	91°	73°	
19	12	44		Em.					325°	325°	
27	14	1		Im.		o	Tauri	,4,5,	138°	81°	
27	15	8		Em.					266°	212°	

Crucible Furnace for Fusion.

Persons who wish to melt or assay steel are not aware how easy it is to obtain a melted mass of one or two ounces, in the space of twenty minutes, without the least difficulty, by means of the following arrangement.

Make a hole in the bottom of a Hessian crucible holding two or

three quarts,—put inside of this crucible the cover of a smaller crucible so that it may rest at about three-fourths of the depth. Make with a file several notches around this cover to admit the air freely, having the knob of the cover uppermost. On this knob place a little crucible containing the metal, which must be covered,—put some lighted charcoal around it, and fill up with coke, (or anthracite coal?) so as to entirely cover the interior crucible. Connect this apparatus with a blacksmith's, or other, bellows, and keep up a constant blast, supplying the waste coal as it is consumed,—in the course of the time mentioned, the steel will be melted. Other metals, even some that are reputed infusible, will yield in like manner. This simple and cheap apparatus abridges time and labour surprisingly, and effects what with the common and costly furnaces would be impossible.—*Silliman's Jour., quoting Jour. de Con. Usuelles.*

Meteorological Observations for April, 1834.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
	1	49°	67°	29.50	29.50	W. S. W.	Moderate.		Lightly cloudy—clear.
	2	44	65	.60	.70	W. E.	do.		Clear day.
	3	43	68	.86	.80	do.	do.		Lightly cloudy—clear.
	4	49	72	30.05	30.05	E.	do.		Clear day.
	5	49	67	29.90	29.80	NE. N.	do.	3.20	Rain in night: thund. & lightning
	6	46	66	.80	.70	W.	do.		Lightly cloudy—flying clouds.
	7	54	70	.70	.50	SE. W.	do.		Rain—flying clouds.
⊗	8	49	61	.50	.55	SW.	do.	0.08	Clear—cloudy.
	9	46	70	.80	.80	W.	Calm.		Clear—cloudy—rain.
	10	48	62	.74	.74	SW.	Blustering	0.35	Flying clouds—rain.
	11	44	73	.84	.69	NW.	do.		Clear day.
	12	50	69	.50	.50	NW.	do.		Clear—flying clouds.
	13	38	52	.25	.20	W.	do.		Frost—lightly cloudy—clear.
	14	33	56	.95	.85	W.	do.		Frost—clear.
	15	32	48	.95	.85	W.	Moderate.		Clear day.
☾	16	31	58	30.15	30.00	W.	do.		Clear—flying clouds.
	17	40	70	.15	.30	W.	do.		Clear day.
	18	50	76	.74	.74	S.	do.		Hazy.
	19	49	84	29.95	.05	SW.	do.		Hazy.
	20	69	85	.64	29.95	N.	Calm.		Hazy.
	21	58	86	.95	.95	SE.	do.		Hazy.
	22	52	83	30.00	30.00	W.	Breeze.		Fog—lightly cloudy—hazy.
⊕	23	53	85	.95	29.95	SW.	do.		Fog—hazy.
	24	62	86	29.90	.80	SW.	do.		Clear day.
	25	60	84	.80	.75	SW.	do.		Cloudy—clear.
	26	60	79	.75	.75	S.	do.		Cloudy day.
	27	60	76	.75	.70	SE.	do.		Cloudy—clear.
	28	58	79	.70	.70	E.	do.		Rain—drizzle.
	29	50	59	.70	.66	E.	do.		Rain—drizzle.
	30	50	57	.63	.60	E.	do.	0.37	Cloudy day.
☽	31	56	71	.20	.80	SE.	do.		Cloudy—rain in the night.
	Mean	49.71	69.42	29.87	29.83	E.	Calm.	0.35	
								4.35	

Thermometer.			Barometer.
Maximum height during the month,		86. on 21st, 24th.	30.74 on 18th.
Minimum	do.	28. on 15th.	29.50 on 1st, 7th, 12th.
Mean	do.	59.56	29.85